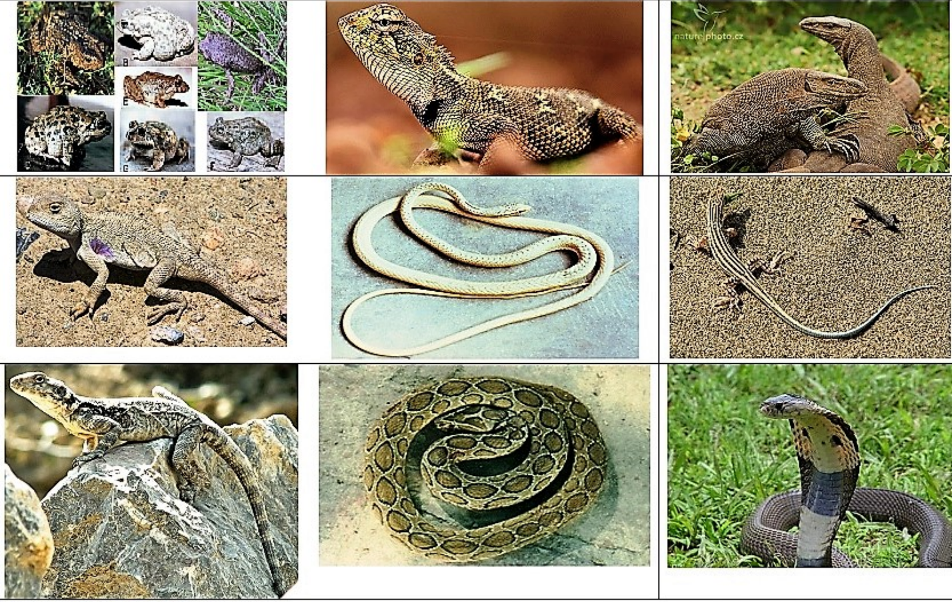

# HERPETOLOGY OF PAKISTAN

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# Chapter 1

## Collection and Preservation of Amphibians and Reptiles

Introduction........................................................
Collection............................................................
Killing and Fixing...............................................
Storage .............................................................

### INTRODUCTION

While going around animal collections in Biology Museums in different education institutions in Pakistan, author has observed several reptilian specimens ruined due to improper preservation techniques. Abdominal region of the specimens is destroyed due to bacterial activity, thick parts of the limbs are abnormally swollen. Preservation of reptiles for museum display or research work involve special methodology. Present paper outlines special instructions necessary for collection, preservation and storage of the herpetological material for scientific study and museum display.

There is yet no adequate reference depository in Pakistan where reference specimens are available for comparison and new material can be deposited with an assurance that it will not be lost. Recently established (1976) Pakistan Natural History Museum, Islamabad, is still in formative stages (Mufti, 1997). Thus these working conditions necessitate building and maintaining personal collections by individual workers, who collects according to his or her research interest throughout life and wants to maintain it healthy for long time.

## COLLECTION

Before starting to work on amphibians and reptiles of an area, familiarise yourself with already known species from the area. It is advised to collect pertinent literature, meet people already working on the animals of your interest. You can gain important information by discussions and know about the types of animals you are expected to encounter in field. A timely advise may change your planning altogether, guiding you in your collections.

There are three ways to build a good representative herpetological collection:

By Picking up road-killed animals, which may be rare and most wanted species. The picked animal should be cleaned of roadside debris and adhering ants and preserved by the method suggested in this chapter.

Acquaintance with personnel of departments of wildlife, agriculture, forest, and teachers of local schools are of great help in building a good collection. They are provided containers with preservative and are requested to put animals killed in their locality in these containers. In this way, material from far flung areas can easily be obtained. Otherwise, time and financial constraints jeopardise year-round collecting from remote areas.

Field collecting trips are the most desirable way to obtain specimens. To ensure a large collection of animals a team of three to four members should be arranged. These trips give firsthand knowledge on habits and ecological data and give firsthand knowledge of their activity and ways of life. However, a field trip entails careful planning, pin pointing the areas from where collection is intended. All potential needs which may arise in field should be anticipated A badly arranged and managed collection tour always ends in disappointment for its participants.

The collection should be as representative of an area as possible. While engaged in field activity, diurnal and nocturnal as well as dawn and dusk periods of animal activity should be kept monitored to ensure collection of as many species as possible.

Field work is a great teacher, it teaches how to collect and where to look. However, a few tips for beginners are given in the following section.

### Collection Tips

Amphibians are best collected at night at their breeding sites. They are spotted by torch-light which does not disturb them. They are caught by hand or a hand-net. Small species like *Microhyla ornata*, *Uperodon systoma*, *Limnonectes limnocharis* and *L. syhadrensis* are best collected by spotting the calling male that perches well away from water, in the marginal grass or other vegetation and are very agile hoppers (Khan and Malik, 1987).

During day amphibians are a bit harder to capture. They may be found by turning stones, logs, debris and leaf-litter, searching along marginal grass along ponds, puddles, and streams, and looking into holes, crevices and fissures in ground. However, at night frogs gather under light posts feeding on photophilic insects and can easily be caught by hand or with a hand-net. Care should be taken not to leave the captured animal in a net, since the captured animal widens net-mesh and sneak out.

Majority of lizards and some snakes are diurnal, become active three to four hours after dawn, and are exceptionally agile. Any disturbance around may drive them into burrow. To extract an animal from burrow is really a difficult and laborious job. Lot of careful surveillance is needed to locate a reptiles in field. While in field, always keep in mind that your movements should look as non-threatening as possible, so move slowly and deliberately. Use your full visual field, observe without turning your head. Most reptiles are located by disturbing bushes and grass or looking under cover such as rocks, logs, leaf litter, bark of trees, trash and other debris. They may be found in crevices and holes in walls, among stones, and in hollow logs.

When you locate a lizard, keep it in your view without directly looking at it. Look unconcerned while approaching it as closely as possible. Now you must decide, how best to get it by grasping it with hand, or giving it a blow with your stick. Grasping with bare hand through branches of thorny bushes should always be avoided. Nocturnal lizards (mostly gekkos) are spotted in torch light on walls, boulders, rock outcrops, or holes in the ground, from where it can safely be caught by hand.

Remember, while in field look as unobtrusive as possible, make no extra movements, walk slowly, looking for any animal movement around you, use your full visual field without turning your head. All the animals hiding from you are keenly observing your movements. Any provocative movement, on your part may derive them in their hideouts. More agile reptiles are located from a distance, preferably before they see you. Observe keenly any movement among vegetation including branches of bushes touching ground. When you have located an animal, keep it in view and approach it as closely as possible. When it is within striking range, give it a powerful blow with the stick. The most active lizards that do not allow a close approach can be shot by an air-gun or stunned by a strong rubber band or rubber sling. To catch one with hand requires a good control of one's wits and takes time. Collection of diurnal reptiles requires lot of patience and some luck. In one locality, a species may be hard to collect, while in another area it may be an easy catch. While turning over rocks, stones, logs, leaf litter etc, care must be taken to use some tool, or protect your hands with heavy gloves. Scorpions and poisonous snakes often hide under these objects.

Nocturnal geckos and snakes are active just after sunset. Geckos are located by looking, in torch light, under bridges and on walls of inhabited houses. Snakes are found along road sides, around human habitations in urban areas, and around ponds and puddles in warm nights. Areas recently watered are often visited by snakes in warm nights.

Many desert lizards are diurnal, they are located and caught easily if there is no cover around. Nocturnal desert gekkos and snakes are spotted by torch light. By day, their tracks lead to their burrows from which they can be extracted.

Things related to animals are of great importance in subsequent taxonomic and ecological studies. They include eggs, egg-shells, larvae, juveniles, broken parts of body, food items, tracks on soil and record of vocalisation.

Most reptiles are best collected by grasping with bare hand. However, large varanids are caught in such a way that animal’s sharp teeth and claws are best avoided. They are grasped from neck along dorsal side with one hand, and with the other from the anal region, so that mouth and claws face away from your body. Turtles and tortoises are caught from the sides of their shell, avoiding contact with claws. Large live lizards and turtles are carried in sacs of firm-material.

Most lizards autotomize their tail during capture, do not discard the broken tail, tie it securely with the specimen, since tail characteristics are of great help in specific determinations.

Extra care should be taken in handling snakes. Colubrids are rarely encountered in field since they are very quick to escape. However, when cornered, some colubrids coil and attack and hiss loudly. Almost all poisonous snakes prefer to lie coiled to escape detection. A coiled snake is easy to handle. For beginners it is advised to kill the snake, by giving a strong blow at mid-section of its body, and wait until it is motionless. Do not smash it's head, its characteristics are important in specific determinations. To ensure death of a snake, turn it in supine position (belly up), if it remains so for 5-10 minutes than it is dead. Often biting reflexes, in an apparently dead snake, persist, so do not handle an apparently dead snake carelessly, always avoid its head.

Catching a live snake is always risky. Even experts are bitten, so avoid it in field. Special sticks to catch live snake are not available in Pakistan. I use the following technique: press snake's head against ground with a strong, half a meter long stick, then grasp it firmly from just behind its head, with your right thumb and fingers, so that the snake cannot turn its head sideways to bite. I do not recommend this method for beginners, they should handle only a dead snake. Catching a live wild cobra is avoided even by experts, it should always be killed first.

Putting a live snake in a collection bag, demands extra care. The cloth bag is held open in left hand, the snake is lifted, held in right hand, well above so that its tail could first be lowered into it. As hand holding snake's head is well down in the bag, the grip is released and hand is quickly withdrawn out of the bag which is snapped close tightly with both hands. The bag is firmly tied with a strong cord. Extra precaution is taken by bending over the tied end of the bag, and tying it double. Bags with living snakes should be handled with care, body contact should be avoided, bags preferably should be carried by holding at the tied end or by the cords, for snake may bite through the bag.

Small lizards are put into plastic bags and tied. In hot weather animals should not be kept for long in plastic bags as they will die and rot.

### Field Collecting Equipment

Every team member should be provided with a set of equipment in an appropriate sling bag. The following items should be included:

1. A strongly bound notebook for recording data.
2. Good quality pencils, ball-point pens, sharpeners, erasers, measuring tape, a penknife, a spool of thread and needles.
3. Good quality torches with spare dry cells and bulbs.
4. A strong walking stick 1.5 m long and 20 mm thick.
5. A hand-net and tea strainer for catching aquatic animals.
6. A Plastic jar with capacity of about 500 ml for frog tadpoles and soft-bodied small frogs and reptiles.
7. Strong cotton sacs of different sizes with strong strings.
8. Strong 40 mm long and 20 mm wide clear plastic bags with double sealed end, for keeping small reptiles. These bags are handy and weightless and are secured by knotting the open end.
9. A pair of Large forceps or tongs to handle obnoxious animals and extract animals from crevices and holes.
10. A whistle that can help team members to locate each other when they become separated. At night a torch may also serve this purpose.
11. A field camera with flash gun.
12. A thermometer and a hygrometer.

### Recording Field Data

Following methodology, to record information pertaining to every collected animal, is important. A specimen without field-data is scientifically useless. The information should be recorded on the spot. Memory should not be trusted as you may later fail to recall important information.

1. Assign an identification code number to each collection tour and mark a part of your notebook accordingly.

2. Assign a collection number to each specimen. Write it on a tag with lead pencil and tie it to a leg of the specimen or around midbody in case of snakes.
3. Enter the following data in notebook referring to its tag number:
   i. Date of collection: day-month-year.
   ii. Time of collection: using a 24-hour clock.
   iii. Locality where collected. Be as specific as possible. Give district, province, distance and direction from nearest town on standard maps. Give name of mountain, highway, river, or canal if appropriate.
   iv. Record ecological data: habitat where animal was found, elevation above sea, temperature/humidity.
4. Name of collector.
5. Take a colour photo of every specimen collected. The habitat in which it was found should be shown. Sometimes a series of photos may illustrate locomotion, breeding, feeding habits of the animal.

## KILLING AND FIXING OF MATERIAL

Preservation of scientific specimens involves killing and fixing and storing it properly. Specimens must chemically be treated to ensure proper preservation of their different body parts in a natural shape as possible, to facilitate later detailed scientific study. In the field it is essential to carry all liquid chemicals in well stoppered, strong plastic bottles.

Concentrated (40%) formalin buffered with calcium carbonate is a good, economical preservative for field work.

Plastic trays with lids are needed for fixing and hardening specimens.

A two meter length of muslin cloth twice the width of the tray is needed.

Syringes (20-50 cc) and needles (16, 20 and 25 g) are required injecting specimens.

### Amphibians

Amphibian skin is permeable and readily absorbs killing agent. Adults, eggs and larvae are put directly in 10% formalin until dead (Khan, 1965, 1982a, 1982b). There are several other killing agents such as chloreton, procaine hydrochloride and barbituates that as equally good but are not readily available in Pakistan and are more costly.

### Reptiles

Lizards and snakes are killed by injecting concentrated formalin at the site of heart, which is at mid-chest in lizards, and about two head lengths from the anterior end of the body in snakes (Fig. 1 A, B, C). Turtles are injected with concentrated formalin at sites indicated ((Fig.1B). Moderate pressure on shell will cause these parts of body to come out. To preserve viscera, formalin is injected deep in the body using special long needles.

### Fixing

A plastic tray is prepared for fixing by folding and spreading half of the piece of muslin cloth at the bottom of the tray. Sufficient 10% formalin is poured into the tray to soak the cloth.

### Amphibians

The frog is taken out as soon it is dead and placed belly down in the fixing tray. Limbs of the animal are folded in natural position. The animal is covered with the other half of the muslin cloth, wetted with 10% formalin, then the tray is covered. The specimen is left for hardening for 6-12 hours.

### Reptiles

The scale-covered, hard skin of reptiles is impermeable to preservatives. So that the animals are fixed by injection of preservative. Concentrated formalin is injected in the body cavity to preserve viscera. Large lizards require injection into other parts of the body also (Fig.1A). If a syringe is not available, a cut in the mid-abdomen of lizard helps penetration of the preservative. Snakes are injected at 4-5 cm intervals along the whole length of belly and tail (Fig.1D). Moderate pressure at the base of the tail of a freshly killed lizard or snake everts its hemipenes. Hemipeneal morphology is very helpful in taxonomic determinations. Injection of formalin at the tail base also serves to put pressure to evert hemipenes and harden them at the same time (Fig.1D).

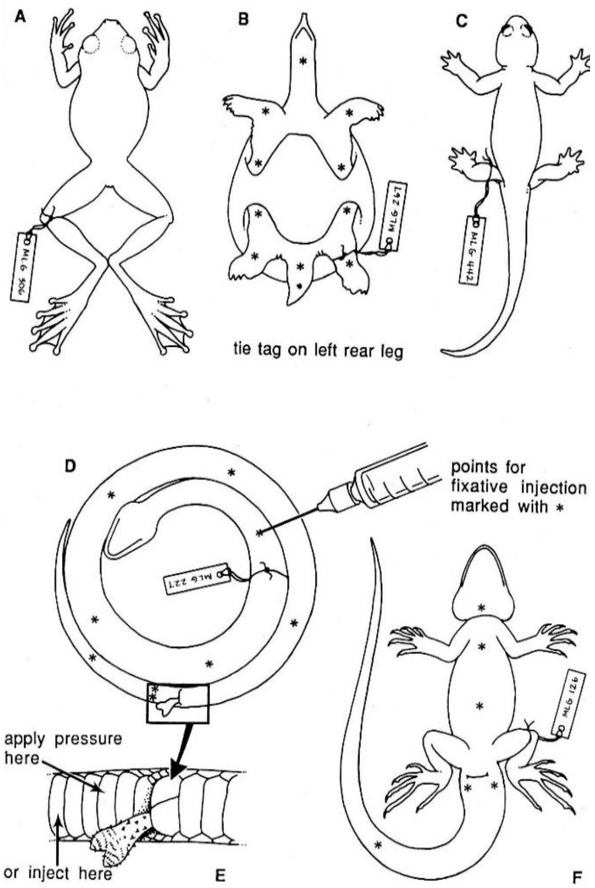


**Fig. 1.** Injection sites (*) of preservative, and hardening postures of animals desired for scientific study: No. Tag with specimen number; E. Extruded hemipenis. A, Frog; B, Turtle; C, Lizard; D, Snake.

Dead lizard is placed belly down, in the fixing tray. Its legs are folded in natural position, soles facing down and digits are evenly spread. The tail is bent on the left side. The cloth is folded over the animal and sprinkled copiously with concentrated formalin and is left for 6-12 hours. Fixing a snake involves coiling its body after injection according to the size of the storage container. After formalin injection it is covered, as usual, with formalin-wetted muslin cloth and left for 12-24 hours depending on the size and bulk of the snake.

## STORAGE OF MATERIAL

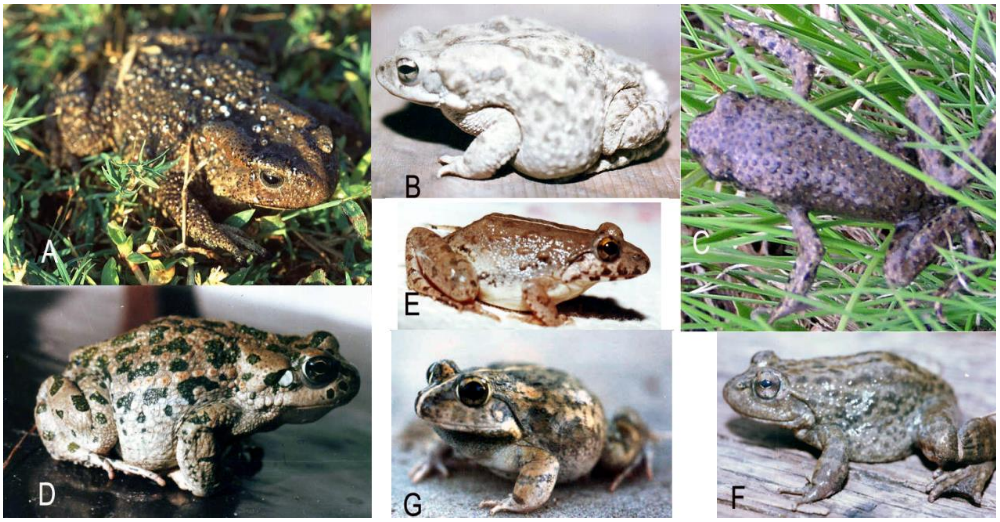
Fixed and hardened specimens are stored in air-tight plastic jars. Caution should be taken not to pack too many specimens in one jar. Over-crowding and too little preservative in the container may distort and ruin the specimens forever.

Jars with specimens should be transported from field carefully. Each jar should be marked with a number, which should be recorded in the data-book. While loading the jars on transport, ensure that every jar is loaded in a secure place. During journey to laboratory, care should be taken, that none of them is damaged. On reaching destination make sure that every jar is unloaded and placed safely.

### Museum Display

Adult animals with all body parts in contact and in good condition, are to be selected for museum display. A clear transparent glass jar, 20-30 mm longer and wider than the specimen, should be selected as container. It should have fairly tight stopper. If the body of the animal is weak, i.e., it cannot stay vertical in the jar, support it by tying it to a glass strip. The jar is filled with 7% formalin, the animal is lowered in it and sealed. The displayed jars should be surveyed time after time. Evaporated preservative should be maintained regularly.

# PART-I
## AMPHIBIA: TOADS & FROGS



| | |
|---|---|
| A | *Duttaphrynus himalayanus* |
| *B* | *Bufo stomaticus* |
| C | *Scutiger nyingchiensis* |
| D | *Pseudepidalea zugmayeri* |
| E | *Fejervarya limnocharis* |
| F | *Allopaa hazarensis* |
| G | *Sphalerotheca breviceps* |

# Chapter 2

# An Overview of Amphibians In Pakistan

Introduction........................................................
Tropography........................................................
Hydrology and Climate.......................................
Vegetation and Habitats......................................
The Amphibian Fauna.........................................
Threats to Amphibians in Pakistan .....................

## INTRODUCTION

Pakistan is relatively a small country. Located in the northwestern corner of the Indian Subcontinent with an area of 796,095 km$^2$ stretching between longitudes 60° 52' to 75° 22' E, and latitudes 24° to 37° N, at the confluence of three mighty mountain ranges, the Himalayas, Karakoram, and Hindu Kush. Its complex geological history and proximity to the mighty mountains its terrestrial panorama changes every few kilometers. So that Pakistan is known as “the land of contrast of habitats,” in terms of geographers “land of many lands" (Ahmed 1951; Mufti *et al.* 1997; Khan 2006).

## TOPOGRAPHY

Three-fourths of the terrain is mountainous, littered with plateaus and valleys at different elevations, with different ecological formations from sea level to more than 6,000 m elevations. The Himalayan great rampart overlooks the vast Indo-Gangetic Plains extending in the west as Indus valley.

*The Indus Valley*: It is 25.9 million hectares of undulating undisturbed plain, stretching from the Shiwaliks at the foot of Himalayas to the shores of the Arabian Sea.  The upper part-Punjab Plain is traversed by the Indus River and its four tributaries, Jhelum, Chenab, Ravi, and Sutlej. The world's most elaborate artificial canal system has been excavated to irrigate vast arid tracts running along the Indus Valley (Khan 1980). The rivers meet at Panjnad in southern Punjab and continue southward as the Indus River draining into the Arabian Sea in the south. The Plain is nearly featureless, though elements of microrelief assume great importance in relationship to flooding, irrigation and delineation of niches, four permanent deserts are interspersed between rivers.

## HYDROLOGY AND CLIMATE

Pakistan is water deficient country. The Indus Valley is the water shed of the Himalayas. The rivers are heavily silted; they overflow during summer monsoons converting disrupting roads and railways, inundating villages and cities, and destroying cattle and crops. A series of world-recognized Ramsar wetlands fed by the seepages and floodwaters, run along the river courses.

Pakistan is geographically located at the western margin of the Monsoon Regime, its climate is more continental than that of other parts of the subcontinent. Climate of different parts of the country vary according to special local ecological conditions.

Hot conditions extend from the Indus Plains to southern and western Baluchistan, while warm are generated from a marked maritime effect extending over a narrow coastal strip. In the northern mountains, there is a progressive cooling with increasing elevation, with mild conditions restricted to lower elevations, while temperatures constantly below freezing and with heavy snowfall throughout most of the year at the highest ones. The continental effect accentuates seasonal differences in temperatures in the interior of the country compared to the Arabian Sea coast (Khan, 2002a).

Himalayas have played an important role in shaping the geology, hydrology, and seasons of the subcontinent. The barometric vacuum created over the subcontinent, attract saturated winds from the sea. The frequency and amount of rainfall is variable from year to year and from place to place. Average annual rainfall decreases from east to west, from approximately 1,500 mm at the lower Ganga and Brahmaputra valleys in India, to 600 mm delivered in the upper part of the Indus Valley in Pakistan. Rainfall also decreases from north to south; during monsoons, the average rainfall on the Indus Plain decreases from 1,300 mm in the northern hilly tracts to 120 mm or less in the south. The sub-Himalayas or Siwaliks humid subtropical conditions are maintained through most of the year and provide ideal conditions for amphibians.

The post-monsoon season extends from October to mid-December. It is a transitional period between the monsoon regime and winter. The temperature gradually falls from 35°C in October to below 10°C by December. Due to the absence of active rain-bearing winds, October and November are the driest months.

## VEGETATION AND HABITATS

The habitats of Pakistan include vast coastal beaches, lagoons and mangrove swamps; sandy rolling deserts and desolate plateaus; fertile plains; freshwater lakes and wetlands; dissected uplands in the middle and high mountains with plateaus, desolate valleys, snow-capped peaks and eternal glaciers. Khan (1999a) classified the major habitats in terms of vegetation and topography and Table 1 in that publication lists those, along with the most characteristic species of amphibians inhabiting them.

## THE AMPHIBIAN FAUNA

### Origin

Pakistan is sandwiched between two main biogeographic regions, the Palearctic in the west and the Oriental in the east, which makes the study of its amphibian fauna particularly interesting to the bio-ecologists (Boulenger 1890; Smith 1931, 1935, 1943; Darlington, 1957; Minton, 1966; Mertens, 1969; Khan, 1980, 2002a, 2006).

Present worldwide distribution of amphibians is reflected in geo-historical processes of breaking and fusion of landmasses, and rise and fall in sea levels (Wallace, 1876, 1881; Darlington, 1957; Voris, 2000). The origin, history and distribution of amphibians in Pakistan and adjacent regions probably date back to the Cretaceous, about 200 million years ago, when the huge landmass of Gondwana fragmented. Its northeastern part broke away as the Indian Plate that drifted northward across the Indian Ocean, sweeping with it several small Islands and, ultimately colliding with the Eurasian landmass. The impact of the collision lifted up the trans-Himalayan ranges of the Hindu Kush, Karakorum, Himalaya, and the Pamir-Tien Shan, and the sub-Himalayan complex of Kohistan (Holmes, 1965; King, 1967; Courtillot and Vink, 1983). These geological upheavals also activated paleo-sutures in Eurasia; a series of complex mountain systems appeared, subdividing and genetically isolating populations of resident animals and plants (Axelrod, 1960; Sengör, 1984; Macy *et al.*, 1999). The present-day complex geomorphology and biodiversity of the region is due to continued mountain building and to changes in ecological conditions (Anderson, 1963; Khan, 1997, 1999b). Recent molecular studies (Mayer and Benyr, 1994; Macey *et al.*, 1999a bibliography has only 1999, 2000) support the hypothesis of a vicariant origin of the herpetofauna and its distribution in Eurasia and Southeast Asia.

By the Oligocene, extreme regions of temperature and precipitation developed in the south of the Indo-Gangetic Plains. Western Eurasian dryness extended onto the subcontinent. The subtropical temperate climate and low rainfall established vast tracts of grasslands as well as the Cholistan and Thar deserts (Ahmed, 1951). These provided habitat corridors allowing immigration of amphibians of North African, Central Asian and Southeast Asian origin into the drier habitats of Pakistan.

By the Pleistocene changes in climate and a corresponding rise and fall in sea level created new pathways for the two-way dispersal of species between Eurasia and the subcontinent (Prater, 1965; Wadia, 1966; Voris, 2000).

## Composition

Pakistani amphibians are a heterogeneous assemblage of 24 species (Appendix in Chapter-3), of which ten fall into three genera of the family Bufonidae (*Bufo* 2 species, *Duttaphrynus* 2, *Pseudepidalea* 6), one genus of the family Megophryidae (*Scutiger* 1) and two genera of the family Microhylidae (*Microhyla* 1, *Uperodon* 1), six of the family Dicroglossidae (*Allopaa* 2, *Chrysopaa* 1, *Euphlyctis* 3, *Fejervarya* 2, *Hoplobatrachus* 1, *Nanorana* 1) and one genus of the family Ranidae (*Sphaerotheca* 1). Wall's (1911) report of a "salamander" from the stomach of a water snake (*Xenochrophis piscator*) in Chitral, northern Pakistan, has not subsequently been authenticated. Perhaps it was a misidentified, half-digested tadpole of some brook frog of the genus *Allopaa* (Khan 1987; Khan and Malik 1987a. Khan (2011) reviewed the herpetology of Pakistani frogs.

## Distribution

Amphibians are distributed in Pakistan over elevations from sea level to almost 4,000 m although no individual species encompasses this entire range. Some species, such as *Bufo olivaceus*, *Pseudepidalea surda* and *Fejervarya syhadrensis* are restricted to relatively low areas, while others, e.g., *Duttaphrynus himalayanus*, *Scutiger nyingchiensis*, and *Pseudepidalea baturae* and are found only at the upper elevations. The remaining species have broad vertical ranges mainly in the low to middle elevations. *Bufo stomaticus* has the greatest vertical distribution, ranging from sea level to above 2,400 m.

Sclater's (1858) Zoogeographical Regions were characterized by the occurrence of relatively similar species in different regions. This sympatry resulted from long evolutionary interactions with changing ecology. The distributional ranges of almost all species of amphibians in Pakistan overlap at some points; sympatric amphibians share common food resources and space.

1. The Indus Valley

Throughout its wide range *Bufo stomaticus* is eurytopic and occurs in a number of habitats; at various places in the Indus Valley it is sympatric with *Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya limnocharis, F. syhadrensis, Hoplobatrachus tigerinus, Bufo olivaceus* and *Sphaeroteca breviceps.* Adults as well as tadpoles of these species utilize common resources in the riparian habitat.

The Balochistan olive toad, *Bufo olivaceus,* extends from the northern Himalayan foothills into the Indus Valley, but is rare and spottily distributed in the latter place. The dicroglossid genera *Euphlyctis, Fejervarya* and *Hoplobatrachus,* are typical plains forms from the Punjab riparian system. The burrowing ranid frog, *Sphaeroteca breviceps* descends into the plains and is spottily distributed along river courses (Khan 2006) and reaches the seacoast. The northern cricket frog, *Limnonectes limnocharis,* from the upper Indus Valley is replaced by *L. syhadrensis* in lower Indus Valley.

2. The Uplands

*Bufo olivaceus* and *B. stomaticus,* are wide-ranging species from the plains to the northern and western foothills; *Duttaphrynus himalayanus* and *D. hazarensis* are sub-Himalayan in distribution; *Pseudepidalea baturae, P. latastii,* and *P. siachinensis* are north-eastern Himalayan forms while *P. surda* and *P. zugmayeri* are south-western Baluchistan species. The Tibetan species, *Scutiger nyingchiensis,* extends into meadows and wetlands in northern Pakistan. The southern Asian ant-frog, *Microhyla ornata*, ranges from the Indus Valley into the sub-Himalayas but does not extend into Balochistan. The secretive microhylid, *Uperodon systoma,* is a subterranean species that has been collected from the Potohar tableland, in Islamabad, Pakistan.

The heterogeneous family Dicroglossidae is represented by seven genera, of which *Allopaa* and *Nanorana,* are torrenticole, inhabiting brooks in the northern sub-Himalayas. Another genus, *Chrysopaa,* inhabits the karez-channels characteristic of the Balochistan highland.

## Assemblages

Of the amphibians of the Indus Plain, *Bufo stomaticus* is the most eurytopic species, extending its range into different ecological situations from Myanmar, Bangladesh, Bhutan, Nepal, Sri Lanka, the whole of India and Pakistan, and southern Afghanistan and eastern Iran. It is a strong human commensal and is one of the most frequent animals met within human inhabitations.

In the northwestern mountains at 3,000 m, other species in the assemblage with B. *stomaticus* include *Pseudepidalea baturae, P. latastii, P. siachinensis, Scutiger nyingchiensis* and *Euphlyctis microspinulata.* Activities of the species in this group are confined to short summers, during which they feed and breed in terraced paddy fields and pools around springs, and torrents, while *Scutiger nyingchiensis* prefers grassfields and meadows with scattered vegetation and tufts of grasses between 3,000 m and 3,500 m elevation.

In the northern Himalayas, between 2,000 m and 3,500 m, the amphibian assemblage consists of Bufo *stomaticus, Duttaphrynus himalayanus* and *D. hazarensis,* the brook frogs *Allopaa barmoachensis, A. hazarensis* and *Nanorana vicina,* the skittering frog *Euphlyctis microspinulata* and *Microhyla ornata*. Mostly pools in the upper reaches of torrents are occupied by torrenticole frogs, while the other species frequent down-stream pools.

The amphibian assemblage in the Balochistan highland contains *Bufo stomaticus,* two species from karez pools, *Chrysopaa sternosignata* and *Euphlyctis microspinulata,* and several species (*Bufo olivaceus*, *Pseudepidalea surda* and *P.* zugmayeri) that invade these pools for breeding. All species of tadpoles develop in the karez pools.

## Speciation and Diversification

Pakistani amphibians are a heterogeneous assemblage of twenty-four species; ten fall in the family Bufonidae, one in Megophryidae, two in Microhylidae, ten Dicroglossidae, and one in Ranidae. Wall's (1911) report of a "salamander" from the stomach of a water snake (*Xenochrophis piscator*) in Chitral, northern Pakistan has not been authenticated; perhaps it was a misidentified, half-digested tadpole of local brook frog of the genus *Allopaa* (Khan, 1987; Khan and Malik, 1987a).

The ten toads fall into three genera, *Bufo, Duttaphrynus* and *Pseudepidalea. B. olivaceus* is a lowland form extending up to 200 m, while *B. stomaticus* is a widely distributed plains form extending up to 4,000 m in the northern and western foothills. The two broad-skulled toads *Duttaphrynus himalayanus* (2,000-3,000 m) and *D. hazarensis* (1,000-2,500 m) are Himalayan and sub-Himalayan in distribution. *Pseudepidalea baturae, P. latastii*, and *P. siachinensis* are highland, north-eastern Himalayan (2,500-3,600 m), while *P. surda* ranges from 500-1,000 m in Balochistan and *P. zugmayeri* is wide ranging (400-2,000 m).

The highland Tibetan genus *Scutiger* (family Megophryidae) is represented by a single species *S. nyingchiensis* in northeastern Pakistan (2,000-3,000 m); recently it has increased its range considerably westward. There are two microhylid species. The common ant-frog *Microhyla ornata* ranges widely from the subHimalayas throughout the Indus Valley (200-2,000 m), while the secretive *Uperodon systoma* is subterranean; it was recently discovered from the bed of a stream near Islamabad, Potohar tableland, Pakistan (500-1,000 m).

Ten species of Dicroglossidae fall in seven genera: two brook frogs *Allopaa barmoachensis* and *A. hazarensis* inhabit the Shiwalik Range (800-1,400 m), while *Nanorana vicina* frequents brooks at lower elevations (1,000-1,200 m). The Balochistan karez frog *Chrysopaa sternosignata* abounds in the karez-channels (1,000- 1,500 m.

The dicroglossid frogs, *Euphlyctis cyanophlyctis* (50-2,000 m), *Fejervarya limnocharis* (200-1,500 m), *F. syhadrensis* (150-1,000 m) and *Hoplobatrachus tigerinus* (50-1,500 m) are typical plain's forms, mostly populating Punjabi riparian systems and wetlands in the foothills of the Himalayas.

## Life History and Ecology

Although some species from the plains are mid-monsoon breeders (Khan and Malik, 1987b), most are pre-monsoon breeders; when summer begins in early March, swamps, irrigation channels, canals, seepage pools, puddles and irrigated fields are invaded and calling groups are formed. Nearly every depression that can hold water teems with tadpoles.

During the summer monsoon rains, the flooding water carries breeding animals and tadpoles far and wide in the valley, where they colonize new sites and places. After the rains (October-November), however, water rapidly recedes and rivers return to their bounds.

Smaller ponds and puddles dry, destroying tadpoles. Few sites retain water long enough to allow tadpoles to successfully metamorphose (Khan, 1980, 1999b, 2006).

Khan and Malik (1987b) and Khan (unpublished data) followed meteorological changes in Punjab, Pakistan, for the years 1979-1981 and 1983-1999 to study the effect of weather on the reproductive activity of sympatric amphibians species. Activities were monitored in natural ponds, puddles and irrigated fields falling within a radius of 1 km from Rabwah City (long. 72.085 °E, lat. 31.045 °N). It was concluded that time and duration of rainfall affects intensity of reproductive activity through its effect on air temperature. Of the period 1979-1981, 1979 was the **r**ainiest, in the sense that total 318 mm of rain was distributed almost evenly throughout the year. The resulting uniform temperature positively affected reproduction, since water at breeding sites was continuously replenished and every species enjoyed ideal conditions for activity and oviposition. In that year, ponds and puddles teemed with tadpoles that successfully metamorphosed.

In 1980 most of the total rainfall of 280 mm was deposited in February-March (148 mm) and was utilized by the early-breeding species *Bufo stomaticus, Euphlyctis cyanophlyctis* and *Hoplobatrachus tigerinus.* That year was hard on monsoon breeders because of meager monsoonal rainfall; some sites dried, killing tadpoles, although those in permanent ponds metamorphosed. By the time heavy downpours came in late August, breeding animals were already spent. Winter started early because heavy rains lowered air temperature to 8°C, thereby curtailing amphibians' activities prematurely.

The year 1981 remained dry for pre-monsoon breeders (March-May), who used channels, seepage pools, irrigated fields and ponds in the suburbs of towns and cities. A total rainfall of 249 mm was concentrated in the monsoon season (July-August). July rain was utilized by the monsoon breeders, but many died in early August because a thunderstorm lowered temperature to 8°C. When temperature was restored to 15°C in mid-August a few breeding groups were observed.

1. Calling Sites

*Bufo stomaticus, B. olivaceus, Hoplobatrachus tigerinus, Euphlyctis cyanophlyctis* and *Sphaerotheca breviceps* call together from the margins of ponds and puddles while highland *Scutiger nyingchiensis* call individually, hidden in meadow vegetation or from under boulders. *Microhyla* and *Fejervarya* are mid-monsoon breeders that start calling by nightfall; males are widely spaced and perch above the surface of the water where they are hidden in vegetation. They usually prefer an elevated piece of land surrounded by shallow water as a calling site, where they sit camouflaged among roots of grasses. Brook frogs, *Allopaa* and *Nanorana*, call from perches on scattered stony slabs while *Duttaphyrnus* call from vegetation along the banks of brooks.

2. Oviposition

Amplectic pairs retreat to relatively calm, deep water, where oviposition takes place. Female toads, carrying male on their backs, swim at depth and wind double gelatinous strings of eggs around submerged vegetation (Khan, 1965). Other species from the plains lay their eggs in small bunches in shallow marginal water, where the eggs are disassociated from each other by the movements of the amplectic pair and stick to grass blades (Khan, 1982b). *Sphaerotheca breviceps* deposits a thin gelatinous film of eggs that floats at surface of the water. The tiny eggs of *Microhyla ornata* are laid in a translucent gelatinous mass at the water's surface (Khan 1982a, 1985). The large eggs of brook frogs are enclosed in spherical jelly capsules that adhere to vegetation and the stony walls of pools and *Scutiger* oviposits under logs and stones in minor streams and pools.

3. Tadpoles

Tadpoles have a globular body, antero-ventral suctorial mouth, sharp beak surrounded by rows of denticles and papillae, antero-dorsal eyes, long muscular tail with dorsal and ventral broad fins. Species differ in minor details. Microhylid tadpoles are transparent with a streamlined body, broad-finned, long tail with vibratile terminal filament, anterodorsal non-suctorial mouth they are nectic-lentic, microphagous filter feeders (Khan, 1982a; 2000). *Bufo* tadpoles are black and smaller with globular body and weaker tail, narrow tail fins; the oral sucker has a typical karatodont formula of 2(2)/3. Dicroglossid tadpoles are relatively large and drab in colour; the body varies from globular to cylindrical, with a long, muscular tail, muscular, spotted with broad black fins. The oral sucker is well developed. The species have different karatodont formulae: *Fejervarya limnocharis* 2(2)/3, *Euphlyctis cyanophlyctis* 1/2, *Hoplobatrachus tigerinus* 5(4+4)/(3+3)5, *Allopaa hazarensis* 8(7)/3(2), and *Chrysopaa sternosignata* 5(4)/3 (Khan 1982a, 1987, 1996a,b; 1999b; Khan and Mufti, 1994a).

*Allopaa* and *Scutiger* overwinter as tadpoles with large deposits of fat (Dubois and Khan, 1979; Khan and Malik, 1987b).

Each species of tadpole has specific ecological preferences and is confined to a distinct microhabitat. Toad tadpoles are benthic-littoral in early stages and their schools swim in shallow marginal water at the soil-water interface. In later stages, they become profundal and are macrophagus raspers. *Fejervarya limnocharis/syhadrensis* tadpoles are lentic-littoral, preferring seepage pools with moderate planktonic bloom and are microphagus as well as macrophagus raspers (Khan, 1996a). *Euphlyctis cyanophlyctis* is lentic-profundal, prefers permanent ponds with little or no vegetation, confines its foraging to the bottom of the pond, rarely comes into the upper layers, and is macrophagus detritivorous (Khan and Mufti, 1995). *Allopaa* and *Chrysopaa* are lentic-profundal, prefer ponds with clear water in the bed of torrents, are macrophagus, herbivorous, and forage on the bottom (Khan and Malik, 1987a). *Microhyla* are lentic-nektic, swim in schools at midstream, and feed by filtering suspended microorganisms from the water (Khan 2000). *Hoplobatrachus tigerinus* is lentic-profundal and carnivorous in habits, lolls at the bottoms of ponds and watches for movement in the upper layers; it occasionally darts to grab passing tadpoles (Khan, 2004a).

Gut content analysis show that each species of tadpole is specific in its choice of quality and type of food (Gosner, 1960; Belova, 1964; Khan, 1999b). The size of food item eaten is related to the tadpole species' specific orpharyngeal apparatus (Khan, 1991). Diet does fluctuate markedly over time, however, in the temperate Indus Valley. As an adaptation hastening development and successful metamorphosis, each species gathers as much food as possible. Even primarily herbivorous tadpoles resort to carnivory in a rapidly drying pool, thereby shortening the time to metamorphosis. The tadpole of *Hoplobatrachus tigerinus* is facultatively predatory on sympatric tadpoles, and accordingly has modified jaws and multidental labial rows of conical teeth that pin down the body of its struggling pray. It uses its strong, sharp jaws to cut large chunks from the body of its victim (Khan, 1996b, 1999b, 2004a). *Euphlyctis cyanophlyctis* usually feeds at the bottom of ponds on detritus containing bacteria and remnants of plants and animals. Under critical environmental conditions, however, it supplements its diet by preying on sympatric tadpoles (Khan and Mufti, 1995).

By mid-monsoon, elevated temperature and high nutrient content encourage rapid growth of plankton in ponds and the water turns green. This usually coincides with breeding in *Fejervarya limnocharis/syhadrensis* and *Microhyla ornata*, so that when their tadpoles appear they have sufficient plankton on which to feed. Unlike stenophagous *M. ornata* tadpoles, however, *F. limnocharis/syhadrensis* are heterophagous, feeding by scraping material from surfaces as well as by filtering plankton (Khan, 1996a; 1999b).

4. Adults

Most adult amphibians are similar in diet, eating mainly insects, worms, and sometimes other anurans. They differ, however, in reproduction (see above), choice of habitat, and method of feeding (Khan, 1999b, Khan and Malik, 1987b).

Toads have a relatively broader spectrum of choice of habitat, are more terrestrial than many frogs, and extend from sea level to alpine habitats. They are commensals of humans. At dusk they swarm from their daytime retreats and to lighted parts of houses and around light posts to catch insects and other prey attracted to the lights (Khan, 1965, 2001a ). *Scutiger nyingchiensis* is associated with alpine streams in moist, forested areas, and temperate/ subtropical/tropical seasonally wet/flooded grassland at high elevations (Khan, 2005).

While frogs extend from sea level to sub-montane regions, they are relatively secretive, seldom seen in and around human inhabitations. The skittering frog *Euphlyctis cyanophlyctis* is resident in almost every pond and puddle where it croaks while afloat (Khan, 1991, 1997a; Khan, and Mufti, 1995). In Balochistan *Chrysopaa sternosignata* and *Euphlyctis microspinulata* are resident in Karez pools (Khan, 1987). *Allopaa barmoachensis*, *A. hazarensis* and *Nanorana vicina* are resident species in the northern mountains, where they rest on stony slabs jutting from the sides of pools in brooks (Dubois and Khan, 1979; Khan and Tasnim, 1989).

## THREATS TO AMPHIBIANS IN PAKISTAN

### Habitat Destruction

The Indus Valley is the most populated and cultivated part of Pakistan. It was formerly grassland with extensive tracts of thorn forest; along watercourses there was thick riverine forest. Reclamation of land, however, has entirely changed the natural complexion of the valley. The region was converted into the main grain-producing area in the country. Most of the riverine forests were felled and the original fauna destroyed (Khan, 2006) although thorn forest still survives in small pockets in areas where human interference is restricted, such as airfields, graveyards, and unattended tracts of land. The cleared valley is now a dry Savannah, with patches of scattered wetlands, shrub and grasslands. Irrigation channels, seepage pools, ponds, puddles, and water reservoirs provide patches of moist refugia for local frogs and toads.

Although loss of habitat has been detrimental to amphibians, not all human activity has been harmful. There has been habitat creation as well as habitat destruction. Some reclamation of wastelands created amphibian-friendly habitats; areas from which no frogs were previously recorded, now abound in frogs and toads. Permanent ponds and puddles, created by digging of soil for construction purposes, are almost a regular feature in low-lying suburbs of nearly every Pakistani city and village. Rain and refuse water continuously fills these to form permanent bodies of water. Thick growths of diverse vegetation along their banks provide shade and creating an ideal environment for local amphibians. High temperatures and the nutrients washed into these ponds encourage development of weeds and plankton, thereby creating favourable conditions for various species of tadpoles (Khan, 1990).

### Agriculture

The increased demand for agricultural products as a consequence of extensive growth in human populations has affected amphibian populations all over the world. Khan (1990) pointed out several anthropogenic factors affecting amphibian populations in Pakistan.

Amphibians take refuge in holes and crevices in and around tilled fields. Ploughing of agricultural land was formerly carried out by oxen that moved slowly, thereby providing amphbians ample time to hop away and escape harm. Now, tilling the soil with fast-moving tractors does not allow amphibians to escape the blades and some injured or killed.

Chemical fertilizers and pesticides are being used extensively in Pakistan to boost agricultural production. These have adverse effects on local amphibians inhabiting crop fields. The sprayed poisons are readily absorbed through the skins of amphibians, thereby killing them. Khan (1990) recorded the dead adult amphibians from eight sprayed cotton fields: *Bufo stomaticus* 489, *Hoplobatrachus tigerina* 42, *Fejervarya limnocharis/syhadrensis* 15, and *Euphlyctis cyanophlyctis* 14. All tadpoles in nearby pools receiving washout from fields were dead.

Granaries harbour insects that are a food source attracting local amphibians. The granaries also provide darkness and shelter that make them favourable habitat for amphians and the frogs remain resident in them. Periodically, granaries are fumigated to remove insect pests, and amphibians seeking refuge there are also killed. Amphibian species recorded as killed by fumigations were *Bufo stomaticus. Hoplobatrachus tigerinus, Euphlyctis cyanophlyctis* and *Fejervarya limnocharis.*

### Urbanization

Throughout the Indus Valley large tracts of “bad land” were acquired to set up industries and associated housing. These areas once contained permanent wetlands providing sites for the breeding, development and feeding of amphibians and other wildlife. Villages and small towns in Punjab and elsewhere in Pakistan used to have ponds and puddles formed from excavations at building sites. These accumulated rainwater that provided breeding sites for local amphibians. With increased urbanization these habitats have largely been destroyed and housing schemes and plaza have appeared instead. The species most adversely affected by urbanization are *Bufo stomaticus*, *Microhyla ornata*, *Euphlyctis cyanophlyctis, Hoplobatrachus tigerinus,* and *Limnonectes limnocharis/syhadrensis.*

Construction of roads is an important element in urbanization schemes. During summer, the traffic on roads takes a heavy toll of local amphibians. Khan’s (1990; his Table 2) survey of amphibian roadkills on a road with normal traffic flow during two consecutive years indicates that almost all local species, except for *Microhyla ornata* and *Fejervarya* spp., were killed.

### Exploitation for Scientific Experimentation and Demonstration

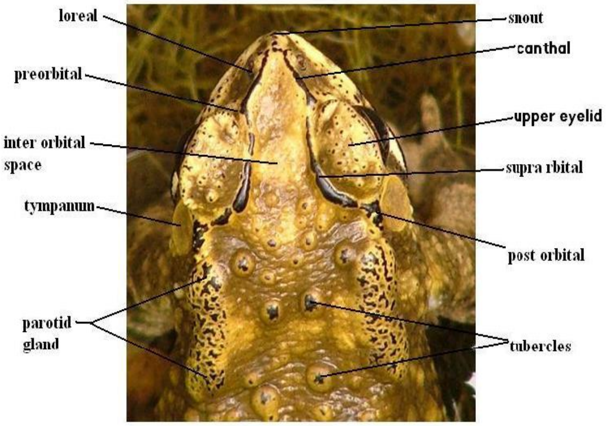
The larger species from the plains, such as *Hoplobatrachus tigerinus* and *Euphlyctis cyanophlyctis*, are extensively used in educational institutions throughout Pakistan for demonstration of vertebrate morphology and physiology. Use of amphibians for this purpose has resulted in depletion of natural populations from large areas in Punjab and Sindh to an alarming extent (Khan, 2006).

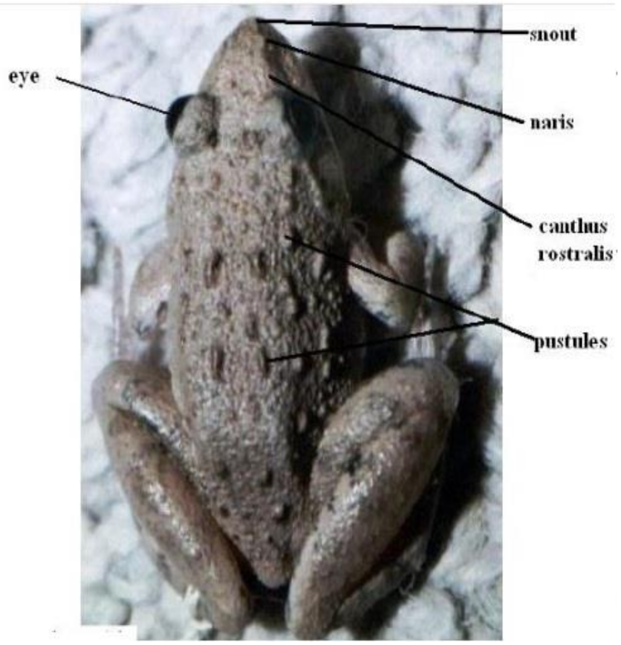
# Chapter 3

## Amphibia Morphology & Description of Species

Morphology........................................................
Key to Families...................................................
Family Bufonidae................................................
Family Megophryidae.........................................
Family Microhylidae...........................................
Family Ranidae...................................................
Zoogeography Distribution................................

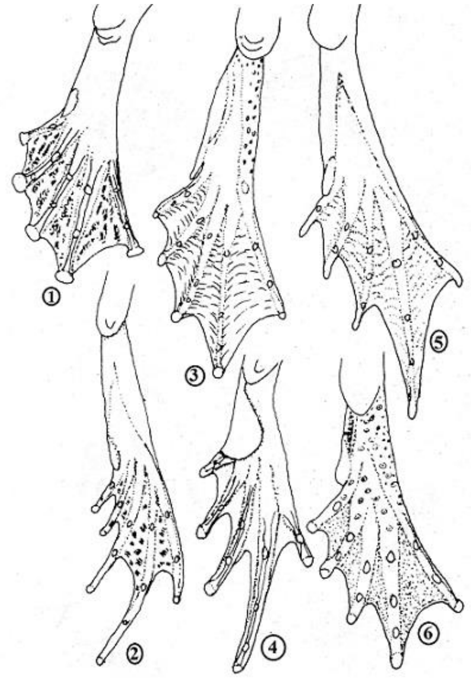
### MORPHOLOGY





## KEY TO FAMILIES

1.a Parotid gland present.............. Bufonidae
b. Parotid gland not present ...................... 2
2. a. Tympanum indistinct; body with thick broken longitudinal folds with tubercles and spines .........Megophryidae
b. Tympanum mostly distinct; body with smooth folds profusely and tubercles ............................................... 3
3.a Pupil vertical ..................... Microhylidae
b. Pupil horizontal.......................... Ranidae



**1.** *A. hazarensis;* **2**. *F. limnocharis;*
**3.** *E. cyanophlyctis;* **4**. *S. breviceps;*
**5.** *H. tigerinus;* **6.** *C. sternosignata.*

### I. Family Bufonidae

**Key:**

1. Head with cranial crests ............................2
Head without cranial crests ........................3
2. Supraorbital crest only is present; tympanum indistinct.......................................... .......................... *Duttaphrynus himalayanus*
Supraorbital, canthal, postorbital, and orbitotympanic crests present, tympanum distinct ....................*Duttaphrynus hazarfensis*
3. Tympanum distinct ....................................4
Tympanum indistinct.....*Pseudepidalea surda*
4. Tibial gland absent .....................................5
Tibial gland present....................................6
5. Dorsum with green pattern.........................7
Dorsum uniformly olive............................... ...............................*Duttaphrynus olivaceus*
6. Tarsal fold indicated by a weak spinulated line .......................*Duttaphrynus stomaticus*
Tarsal fold present.... *Pseudepidalea latastii*
7. Dorsal pattern of scattered green spots ........

............................*Pseudepidalea zugmayeri*
Dorsal pattern of coalesced green blotches..........*Pseudepidalea pseudoraddei*

### 1. *Bufo olivaceus* Blanford
**(Fig.3.1)**

1. No cranial crest.
2. Tympanum very distinct.
3. First finger longer than the second.
5. Subarticular tubercles of toes single, no tarsal fold.
6. Parotoids depressed, elongated, reaching to sacral region.
7. Dorsum is smooth.
Snout-vent length 52-65 mm.

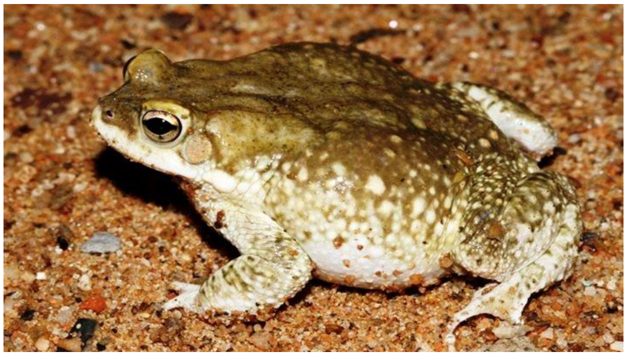


**Fig.3.1.** *Bufo olivaceus* Blanford.

*Colour:*
Uniformly greyish-olive dorsum, with darkish spotting on limbs; ventrum whitish.

*Habitat:*
Confined to the oases and pools of karez water (underground streams, typical for Balochistan). Nocturnal, often ventures into human habitations to feed on photophilic insects.

*Range:*
Recorded from the extreme western parts of Balochistan and adjoining Iran.

### 2. *Bufo stomaticus* Lütkin
**(Fig.3.2)**

1. No cranial crests.
2. Tympanum distinct, round, its diameter two thirds that of eye.
3. First and second fingers subequal.
4. Toes with single subarticular tubercles.
5. A tarsal spinulated ridge.
6. The parotoid gland is longer than broad.
7. A distinct tibial gland is present.
Snout-vent length 67-70 mm.

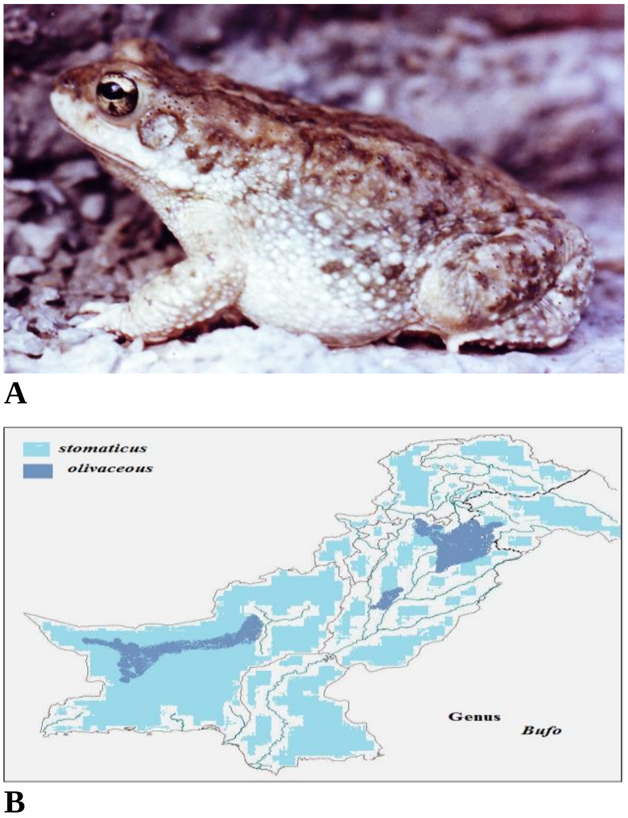


**Fig.3.2. A,** *Bufo stomaticus* Lütkin. B shows distribution of Genus *Bufo* in different parts of Pakistan.

*Colour:*
Dorsum light gray or olive to almost black, with dark mottling or gray to dark reticulation; upper lip cream. Ventrum dirty white, dark mottling on throat, 3 dark transverse bands on anterior aspect of forearm. Tips of digits dark brown.

*Habitat:*
The most common toad in the plains of Punjab and Sindh. It extends to an elevation over 2000 m in the northern and western hilly areas.

*Range:*
Widely distributed throughout the Indo-Pakistan subcontinent, from Bangladesh through the Ganges Plain, peninsular India, upper and lower Indus Valleys, Balochistan, Afghanistan, Iran, and Muscat. It does not extend beyond Mumbai along the west coast of southern India.

### *3. Duttaphrynus himalayanus* Günther

**(Fig.3.33)**

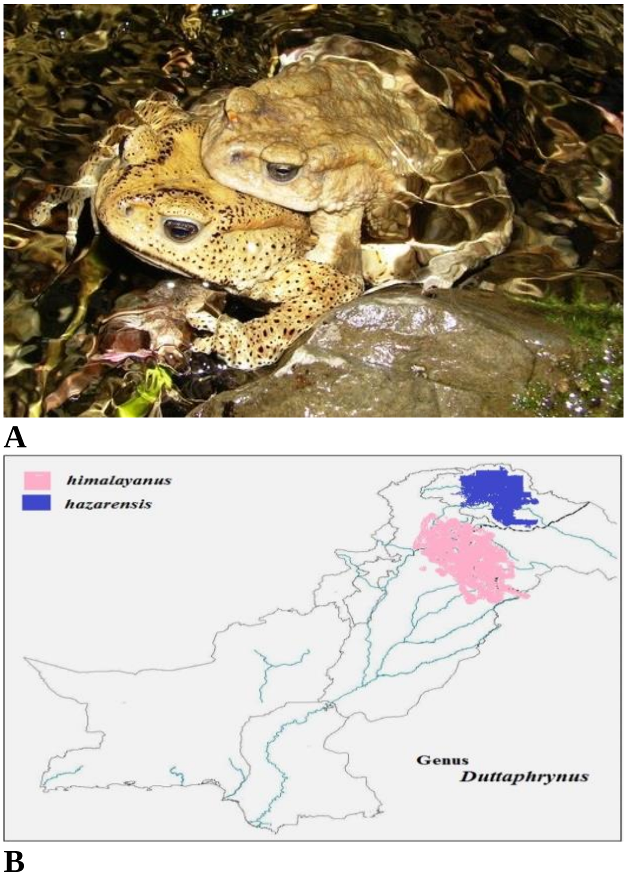


**Fig.3.3. A,** *Duttaphrynus himalayanus* Günther. B shows distribution of Genus *Duttaphrynus* in different part of Pakistan.

1. Supraorbital and canthal ridges, present.
2. Interorbital space broader than the upper eyelid.
3. Tympanum very small or indistinct.
4. First finger does not extend beyond second.
5. Toes with single subarticular tubercle, no tarsal fold.
6. Parotoid gland as long as head.
7. Body with irregular porous tubercles. Snout-vent length 130-132 mm.

*Colour:*
Uniformly brown. Cranial crest and tips of digits dark brown.

*Habitat:*
A mountain species.

*Range:*
From the Himalayas at 2000-3500 m of elevation. In Pakistan recorded from Azad Kashmir, Hazara Division, Khyber Pakhtunkhwa.

### *4. Pseudepidalea latastii* Boulenger

**(Fig.3.4)**

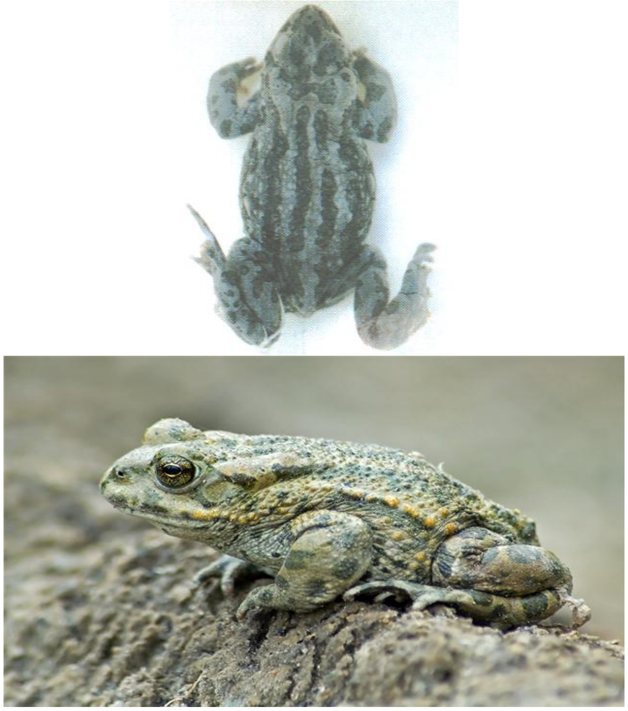


**Fig.3.4.** *Pseudepidalea latastii* Boulenger.

1. No bony ridges on head.
2. Interorbital space narrower than the upper eyelid.

3. Tympanum distinct, half the diameter of the eye.
4. Toes with double subarticular tubercles.
5. Parotoid kidney-shaped.
   Snout-vent length 50-62 mm.

*Colour:*
Dorsum olive, spotted or marbled with black; light and dark stripes on body dorsum. Ventrum more or less spotted and tips of digits black.

*Habitat:*
High-altitude toad is found in shallow pools of water along streams in valleys. Hides under stones, rocks, and vegetation.

*Range:*
Ladakh in Baltistan between 2600 and 3000 m of elevation.

*Taxonomic Note:*
Khan (1997) described this toad as Bufo siacheninsis (Pakistan J. Zool. 29(1):43-48), from Shinu village, on the left bank of the River Shyok, 140 km east of Skardu, at the foot of Siachen Glacier, Baltistan, northeastern Pakistan.

### 5. ***Duttahrynus hazarensis*** Khan
**(Fig.3.5)**

1. Head with bony ridges, temporal ridge present; rostral absent.
2. Parotoid glands kidney-shaped.
3. Double subarticular tubercles under penultimate phalanx of all fingers.
   One of Pakistan's largest toad, female exceeds 150 mm in snout-vent length.

*Colour:*
Dorsum uniformly gray of various shades, brown or reddish with dark spots, ventrum uniformly dirty white; speckled with light brown on chin and throat.
Throat of the breeding male is light orange or yellow. It develops cornified pads on inner side of first and second fingers.

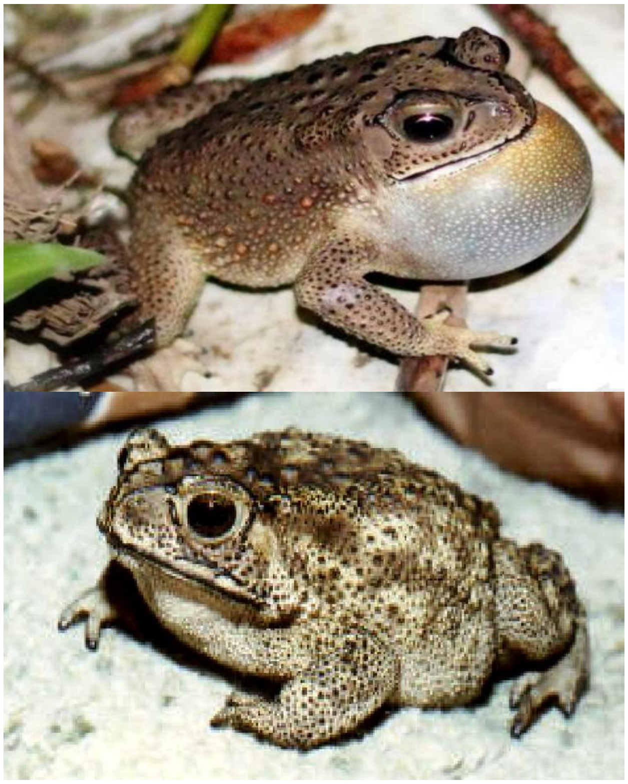


**Fig.3.5.** *Duttahrynus hazarensis* Khan.

*Habitat:*
A rare toad, mostly confined to the low northern hilly ranges and Azad Kashmir. Lethargic timid animal moves about with deliberate hops from place to place in search of insects.

*Range:*
Reported to be confined to District Hazara, Khyber Pakhtunkhwa, Alpine Punjab and Azad Kashmir.

### 6. ***Pseudepidalea pseudoraddei*** Mertens
**(Fig.3.6)**

No cranial crests. Recognized from *P. zugmayeri* by its heavy dorsal body color and typical pattern.

*Colour:*
The dorsum is dark green with a light vertebral stripe and lighter spots on flanks. Limbs are with large dark blotches. Dorsal tubercles are not so prominent, rather they are flat.

*Habitat:*
Inhabits rocky areas around Mingora, Swat. During the day, it hides under stones and retreats into fissures among rocks, swarming out at dusk.

*Range:*
From Mingora, high mountains of eastern Afghanistan.

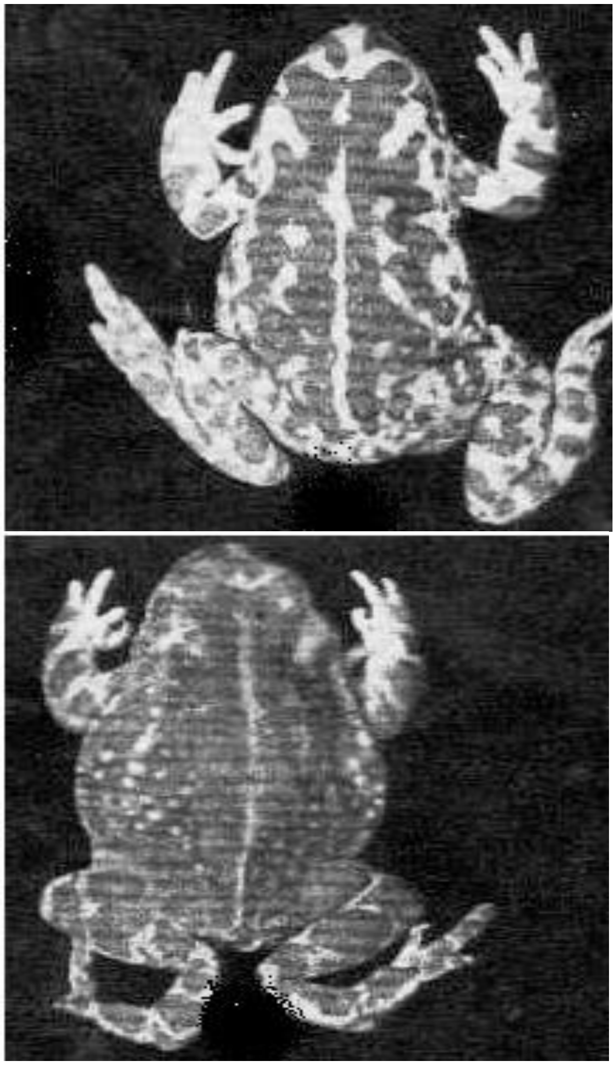


**Fig.3.6.** *Pseudepidalea pseudoraddei* Mertens.

### 7. ***Pseudepidalea baturae*** Stöck, Schmid, Steinlein, Grosse
**(Fig.3.7)**

1. No cranial crests.
2. Parotoids inconspicuous.
3. Interorbital space smaller or nearly equals the internarial space.
4. Subarticular tubercles single under toes; often double on first, second and, in some cases, third finger.
   Snout-vent length 60-65 mm.

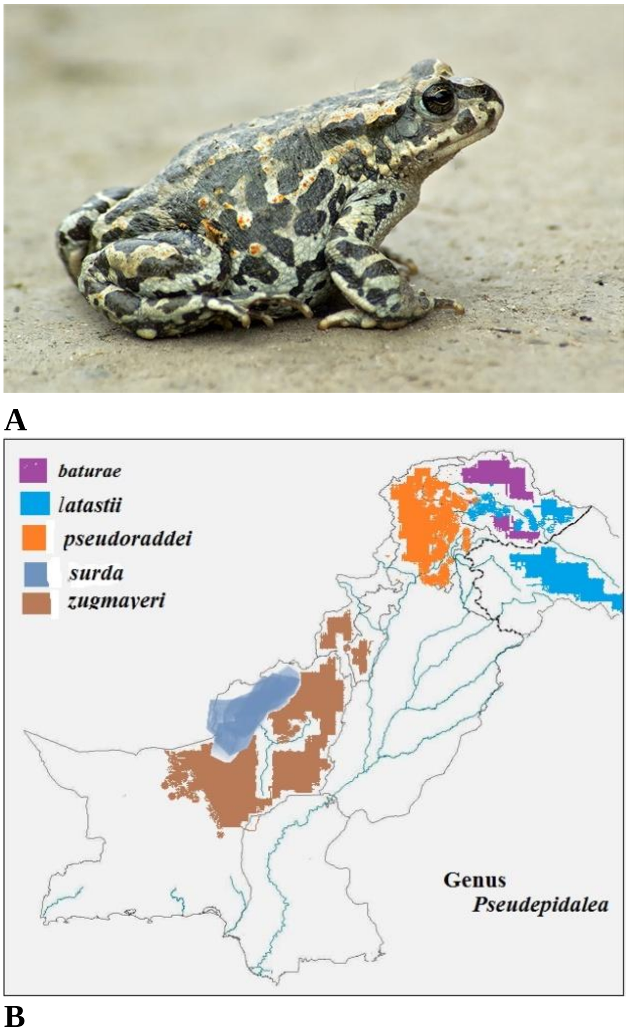


**Fig.3.7. A,** *Pseudepidalea baturae* Stöck, Schmid, Steinlein, Grosse. B shows distribution of Genus *Pseudepidalea* in different parts of Pakistan.

*Colour:*
Dorsum grayish green or grayish brown, with irregular dark green spots, mostly smaller or about the size of the eye. Spots partially

connected to form a marbled pattern with indented margins. In male brownish or grayish irregular spots at extremities.

*Habitat:*
A mountain species, it inhabits marginal vegetation along fast-flowing streams in the glacier-ridden northeastern Pakistan.

*Range:*
Swat, Passu, Swat, Karakoram Range, Gilgit Agency, Baltistan, Pakistan.

### 8. *Pseudepidalea surda* Boulenger

**(Fig.3.8)**

1. Head without cranial crests.
2. Interorbital space narrower than the upper eyelid.
3. Tympanum distinct, about half the diameter of the eye.
4. Fourth toe with single subarticular tubercles.
5. Parotoid squarish, as long as upper eyelid.
6. Dorsal tubercles unispinulate.
   Snout-vent length 45-65 mm.

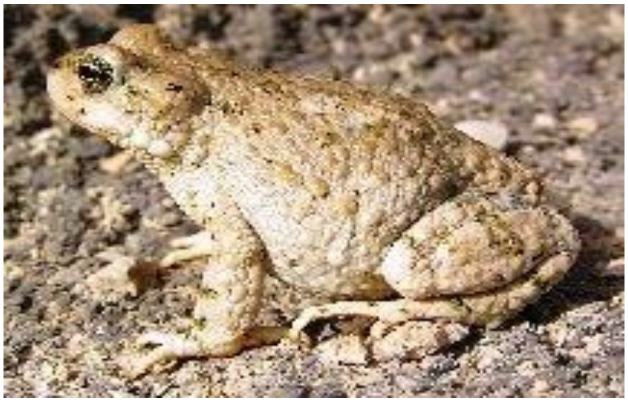


**Fig.3.8.** *Pseudepidalea surda* Boulenger.

*Colour:*
Dorsum gray, with greenish spotting; a dark blotch on the upper eyelid.

*Habitat:*
Nocturnal, spends day hiding under stones, vegetation, and falling logs, retreating into holes and crevices in the ground.

*Range:*
A little known species. Reported along western Balochistan and around Quetta, however, widely reported in adjacent Iran and Afghanistan.

### 9. *Pseudepidalea zugmayeri* Eiselt and Schmidtler

**(Fig.3.9)**

1. No cranial crests.
2. The post-tympanic part of the parotoids extends on side to lower tympanic fold.
3. The interorbital space wider than the upper eyelid.
4. First finger longer than second.
5. Double subarticular tubercles under fourth toe.
6. Smooth tarsal fold.
7. Body dorsum with numerous weak warts, which are arranged in double rows on flanks.
   Snout-vent length 50-70 mm.

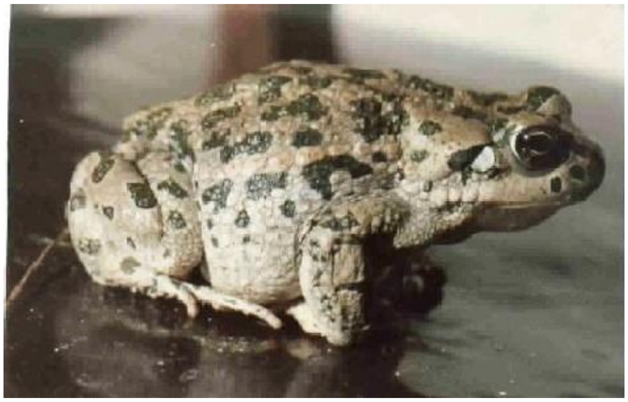


**Fig.3.9.** *Pseudepidalea zugmayeri* Eiselt and Schmidtler.

*Colour:*
Light brown, head and body with numerous small dark green spots, smaller than eye. Finger and toe tips light.

*Range:*
Mountain ranges around Quetta, extending southwest into Chagai, Balochistan.

## II. Family Megophryidae

### *Scutiger nyingchiensis* Fei

**(Fig.3.10)**

1. Dorsum with spiny tubercles and interrupted longitudinal short spiny folds.
2. Tympanum indistinct.
3. Snout round, scarcely projecting, canthus obtuse, loreal oblique and concave.
4. Fingers short and flattened, first as long as or a little shorter than second.
5. Toe tips obtuse, nearly entirely webbed, distal phalanx of the fourth toe free.
Snout-vent length 50-57 mm.

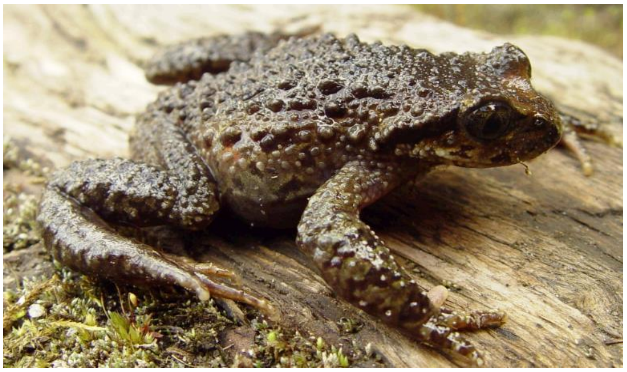


**Fig.3.10.** *Scutiger nyingchiensis.*

*Colour:*
Uniform dark olive dorsum or with numerous small dark spots. A light median stripe sometimes present. A black stripe from snout, naris, eye, and shoulder.

*Habitat:*
Himalayan torrenticole frog, between 3000 and 5000 m of elevation.

*Range:*
Ranges from Tibet to Kashmir.

## III. Family Microhylidae

**Key:**

1. Body frog-like, tongue elliptical; a dermal ridge between internal naris; adult does not exceed 30 mm in body length...............................genus *Microhyla*
Body globular, tongue oval; a pair of tubercles between internal naris; adult size 50-60 mm.................. genus *Uperodon*

### 1. *Microhyla ornata* (Duméril and Bibron)

**(Fig.3.11)**

1. A small, slender-bodied, narrow mouth frog, snout-vent length hardly exceeds 30 mm.
2. Interorbital space broader than the upper eyelid.
3. Fingers slender, first much shorter than second.
4. Toes long with slight rudiment of web.
5. Subarticular tubercles distinct, tips of digits slightly swollen.
6. Dorsum smooth or slightly tuberculated.
8. No tarsal fold.
Snout-vent length 27-29 mm.

*Colour:*
Dorsum reddish olive, with an elongated dark brown mark along midback, extending from between eyes backward, narrowing on nape, widening above shoulders, narrowing then widening at back, sends a stripe to groin and another to thigh on each side. A dark streak from the eye to the shoulder, the limbs are barred. Ventrum white, throat and chest dark brown in breeding male.

*Habitat:*
A small active frog, hides under stones, logs, and heaps of vegetation, and in fissures and holes in ground, along the sides of streams and ponds.

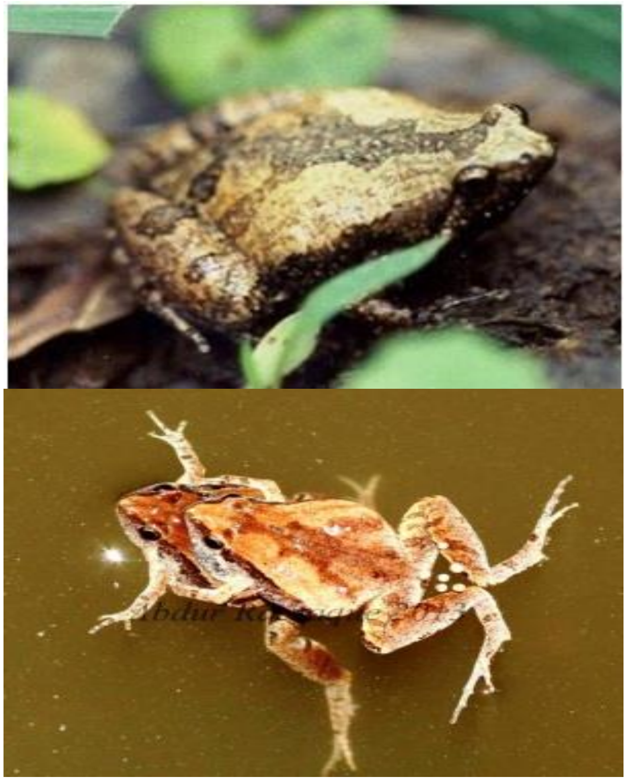


**Fig.3.11.** *Microhyla ornata* (Duméril and Bibron).

*Range:*
A wide-ranging Southeast Asian species, extends from the Malay Peninsula, Siam, southern China, Cambodia, Myanmar, Nepal, Kashmir, Sri Lanka, and throughout India; recently shown to have wide Range in Punjab, Pakistan

## *2. Uperodon systoma* (Schneider)
**(Fig.3.12)**

1. Rotund, stout body, puffed round ball-like.
2. Snout scarcely longer than diameter of the orbit.
3. No canthus, snout round.
4. Fingers moderate, first a little shorter than second.
5. Toes short webbed at the base.
6. A pair of strong shovel-shaped metatarsal tubercles, inner larger.
7. Dorsum smoothly tubercular, supratympanic fold present, throat and chest smooth, belly and cloacal region granular.
   Snout-vent length 50-60 mm.

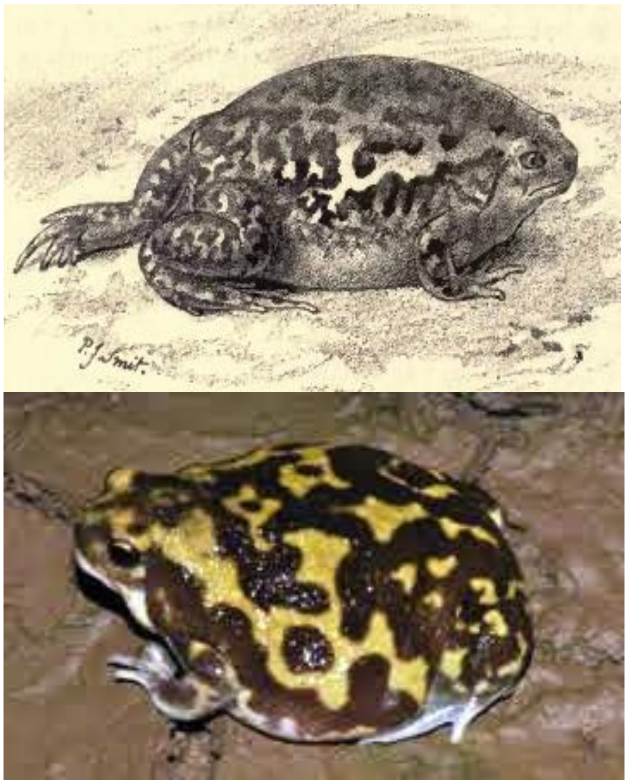


**Fig.3.12.** *Uperodon systoma* (Schneider).

*Colour:*
Body dorsum with more or less symmetrical dark brown pattern on a pinkish brown background. Ventrum whitish immaculate.

*Habitat:*
Completely fossorial species, it surfaces during summer monsoons. moves by small hops or slowly walks; is a weak swimmer, floats in water, It is an excellent burrower, quickly burrowing into the loose moist soil with the help of its well-developed and powerful metatarsal tubercles.

*Range:*

A very rare frog in Pakistan, recently a specimen was collected from the foot of Shakarparian Hills, Islamabad, from the side of a stream during a wet May night. This species is widely distributed in southern and eastern India, extending into northern Sri Lanka.

## IV. Family Ranidae

**Key:**

1. Tympanum indistinct........*Nanorana vicina*
   Tympanum distinct....................................2
2. Toes half webbed......................................3
   Toes extensively webbed...........................5
3. Habitus toad-like, inner metatarsal tubercle shovel- shaped .......*Sphaerotheca breviceps*
   Habitus frog-like, inner metatarsal tubercle elongate.....................................................4
4. First finger hardly extending beyond second; tibiotarsal joint reaching to anterior border of eye or a point between eye and tip of snout .................. *Fejervarya syhadrensis*
   First finger longer than second; tibiotarsal joint reaching tympanum or naris ...............................*Fejervarya limnocharis*
5. Body dorsum pustulate ..............................6
   Body dorsum with longitudinal folds ............................*Hoplobatrachus tigerinus*
6. Nuptial spines on at least first 2 fingers.....7
   Nuptial spines absent .................................. .............................*Euphlyctis cyanophlyctis*
7. Pustules large, multispinulate; belly spiny .............................*Chrysopaa sternosignata*
   Pustules small, unispinulate; belly spineless.8
8. Spinules on longitudinal ridges Spinules on pustules .........................*Allopaa hazarensis*

### 1. *Euphlyctis cyanophlyctis cyanophlyctis*
(Schneider)
**(Fig.3.13)**

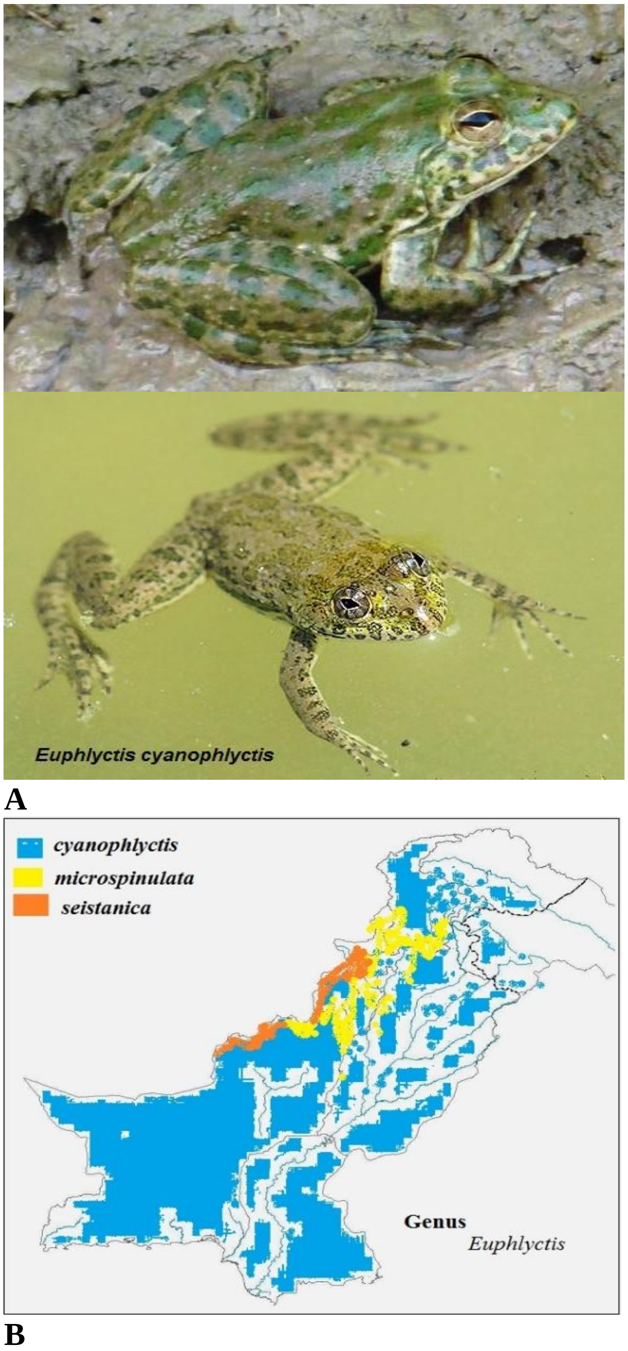


**Fig.3.13. A,** *Euphlyctis cyanophlyctis cyanophlyctis* (Schneider). B shows distribution of Genus *Euphlyctis* in different parts of Pakistan.

1. The interorbital space is narrower than the upper eyelid.
2. Tympanum is distinct, about two thirds the size of the eye.
3. Fingers slender, pointed or slightly swollen

at the tips, first not extending beyond second.
4. Toes are completely webbed.
5. Inner metatarsal tubercle long, conical much like a rudimentary toe.
6. Male with vocal slits under the lower jaw.
7. Dorsum with numerous scattered small smooth tubercles, sides of body rugose, ventrum smooth. Male (43-46 mm) is smaller than female (55-67 mm) in snout-vent length.

*Colour:*
Dorsum light gray, olive-green or light brown, sometimes black, with irregular black spots. Thighs posteriorly dark with one or two yellow or white irregular longitudinal stripes; ventrum white, immaculate or with dark speckling or reticulation; vocal sacs light brown.

*Habitat:*
Highly aquatic and littoral frog. It remains permanently resident in different types of habitats with pooled water, in the plains and sub mountainous parts of Pakistan. The frog is remarkably capable of adjusting itself to the uncertain aquatic conditions in temperate arid parts of Pakistan. Its peculiar unique habit of skittering over the water surface is reported by the Mogul Emperor Babar in his autobiography.

*Range:*
Most widely distributed Oriental frogs. It extends from Thailand to Nepal, throughout India, Sri Lanka, almost throughout Pakistan, Iran and Afghanistan.

Two subspecies:

### 1. ***Euphlyctis c. seistanica*** (Nikolsky)

The snout is longer than length of the orbit.

*Range:*
Seistan, along the Pakistan-Afghanistan-Iran border (Khan 1997c).

### 2. ***Euphlyctis c. microspinulata*** Khan

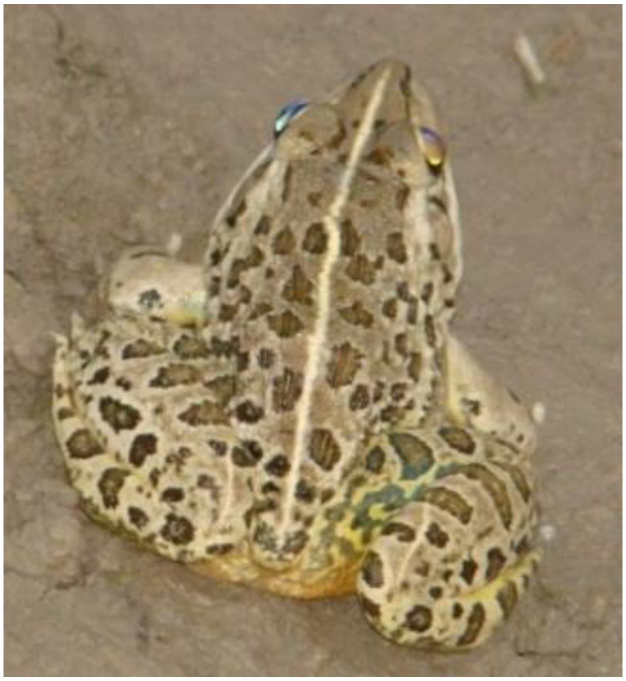
Fingers and toes with minute spinules.

*Range:*
Widely distributed in Balochistan, Afghanistan. Specimens have been collected from Waziristan and the Mianwali region, and around Jhelum city in Punjab, Pakistan.

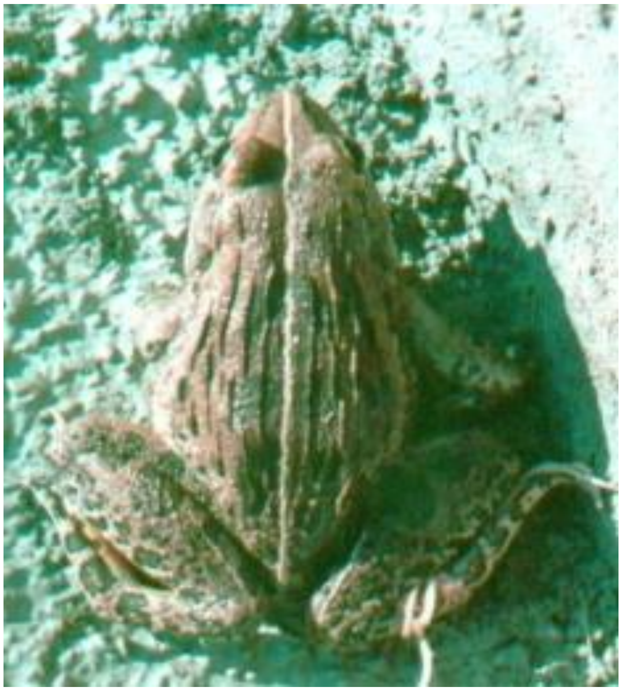
### 2. ***Hoplobatrachus tigerinus*** (Daudin)
**(Fig.3.14)**

1. The head is slightly longer than wide; in older specimens it is wider.
2. Interorbital space much narrower than the upper eyelid.
3. Tympanum distinct, almost as large as the eye.
4. Fingers obtusely pointed, first longer than second.
5. Tibiotarsal articulation reaches eye or between eye and the naris.
6. Toes obtuse, with slightly swollen tips, entirely webbed, feebly emarginate.
7. Dorsum smooth or granular, with 6-14 longitudinal broken folds, occasionally interspersed with smooth tubercles, ventrum smooth.

*Colour:*
Dorsum olive green, olive or gray, with dark blotches, a light yellow vertebral streak, rarely absent; a dark canthal and a lighter labial streak often present; limbs with dark bars, which may break into dark blotches; thighs posteriorly marbled with black and yellow; a fine yellow line along upper surface of thigh, another on the inner side of calf. Ventrum white, sometimes feeble pigmentation on throat.

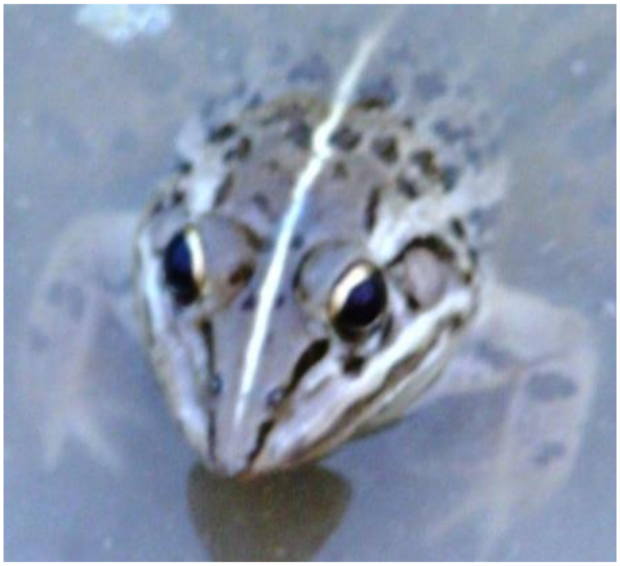


**A**

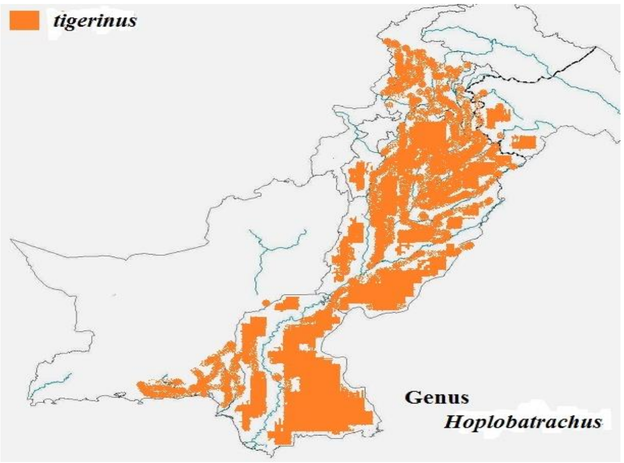


**B**

8. Forelimbs of breeding male are thick, first finger is swollen, with grayish brown velvety horny layer at its base, blue vocal sacs are located on sides of the throat.
   Snout-vent length 130-145 mm.



**C**



**D**

**Fig.3.14.** *Hoplobatrachus tigerinus* (Daudin). D shows its distribution in different parts of Pakisan.

*Habitat:*
Largest frog in the Pakistani plains. It hibernates by burrowing in soil during winter as well as during drought.
The frog does not stay in water for a long time; it spends most of its time hiding and feeding in surrounding vegetation. On approach of danger, it plunges into deep water, stays underwater for 2-3 minutes, then returns quietly to the marginal vegetation undetected. In clear pools of water it hides under bottom gravel.

*Range:* Most common frog in the Indo-Gangetic plains, mostly frequents cultivated areas and swampy wastelands. It does not extend into Balochistan, reported from Afghanistan close to the Khyber Pass.

### 3. *Fejervarya limnocharis* (Boie)

**(Fig.3.15)**

1. Snout pointed, projecting beyond mouth.
2. Internarial space is longer than interorbital width, which is much less than width of the upper eyelid.
3. Tympanum distinct, half to two-thirds the diameter of eye.
4. Fingers obtusely pointed, first longer than second, subarticular tubercles very prominent.
5. Tibiotarsal articulation reaches tympanum or naris.
6. Toes obtuse or with slightly swollen tips, half webbed, subarticular tubercles small and prominent.
7. Male with loose gular region, with brown or blackish W-shaped mark, forelimbs stronger, with pad-like subdigital tubercles under first finger.
   Snout-vent length 39-43 mm.

*Colour:*
Gray brown or olive above, sometimes suffused with bright carmine; a V-shaped dark mark between eyes, a yellow vertebral stripe mostly present; lips and limbs barred, a light line along calf, thighs laterally yellow, marbled with black, ventrum white, throat is mottled with brown in male.

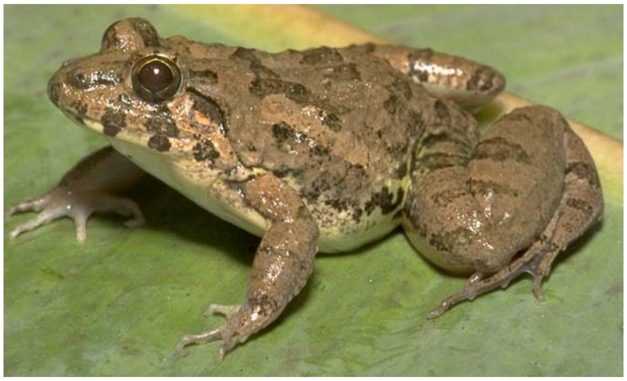


**Fig.3.15.** *Fejervarya limnocharis* (Boie).

*Habitat:*
Most common and widely distributed species, frequents marginal vegetation along canals, streams, fast-flowing streams, ponds, and puddles; when disturbed it leaps into the water, swimming back at once.

*Range:*
Sub-Himalayan parts of Pakistan, descending into the waters of Potwar Tableland to most of the Punjab plains and some of the lower Indus Valley where it is scarcer. It ranges from Japan to Pakistan.

### 4. *Fejervarya syhadrensis* (Annandale)

**(Fig.3.16)**

1. First finger hardly extends beyond second.
2. Tibiotarsal articulation reaches anterior border of eye or a point between it and the tip of snout.
   Snout-vent length 32-34 mm.

*Colour:*
Grayish dorsum, with dark spots, sometimes with reddish and orange suffusion, a light narrow middorsal line is often present. Ventrum white. In breeding male gular region is black.

*Habitat:*
Abounds in paddy fields, marginal vegetation of ponds, puddles, and streams in plains. It becomes rarer in northern hilly tracts along sub-Himalayan ranges. Its call is typical, like the clatter of a typewriter, a loud "Trr, trr, trr, trr, trr", repeated several times.

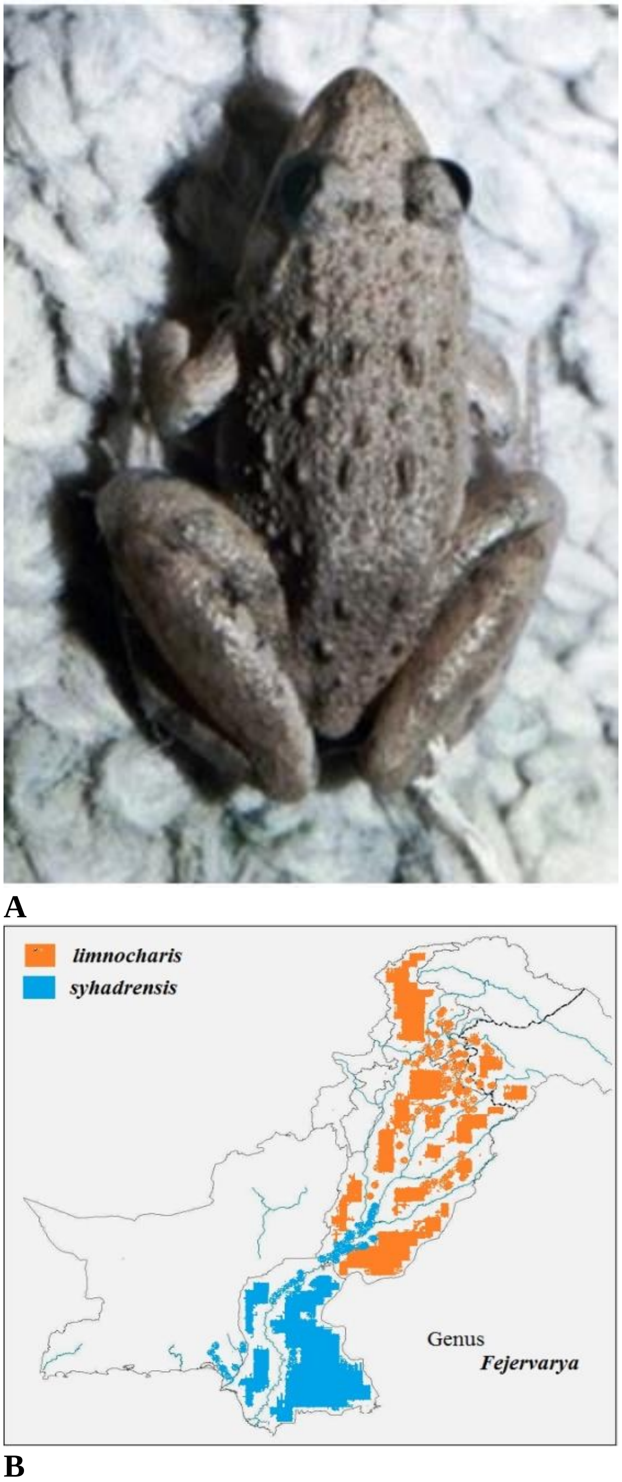


**Fig.3.16.** *Fejervarya syhadrensis* (Annandale). B shows distribution of species of genus *Fejervarya* in different parts of Pakistan.

*Range:*
Occurs sympatric in most of its range in Pakistan with Fejervarya limnocharis, which becomes rarer in the lower Indus Valley. Fejervarya syhadrensis is widely distributed throughout southern India.

### 5. *Allopaa barmoachensis* (Khan and Tasnim) **(Fig.3.17)**

l. Head is wider than long.
2. Naris is below canthus, distance between naris greater than the width of the upper eyelid.
3. First finger longer than second.
4. Tips of digits swollen, with distinct large subarticular tubercles. A distinct groove between penultimate and last phalanx.
5. Body dorsum with dark unispinulate small tubercles.
6. Interorbital region tuberculated.
7. Male with nuptial spines on first finger and inner metacarpal tubercle.
8. Tympanum distinct.
Snout-vent length 56-61 mm.

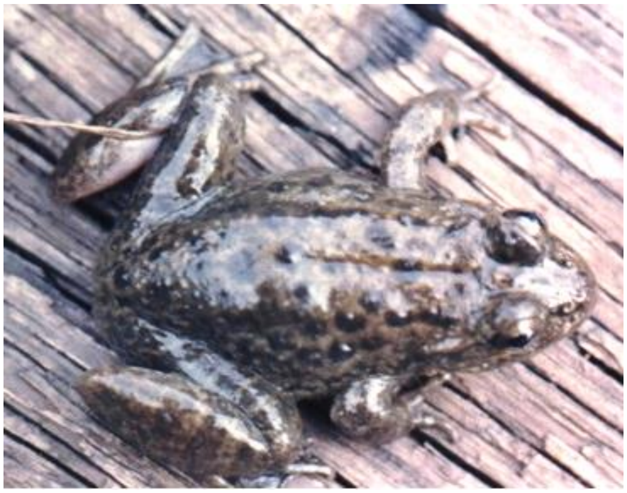


**Fig.3.17.** *Allopaa barmoachensis* (Khan and Tasnim).

*Colour:*
Dorsum gray olive in life with scattered dark

spots more numerous on flanks than in middorsum, a distinct pair of dark spots between eyes; dark mottling on forehead, jaws, supratympanic fold, canthus dark; fore- and hind limbs with crossbars breaking into a network of small brownish spots on hind of thighs. Ventrum dirty white, with light suffusion under hand and foot; throat and gular region mottled with gray; web between fingers olive gray.

*Habitat:*
Torrenticol frog.

*Range:*
Collected from Aram Bari, Tatta Pani, Charnali, and Kotli, all in District Kotli, Azad Kashmir.

### 6. *Allopaa hazarensis* (Dubois and Khan)
**(Fig.3.18)**

1. Head longer than wide.
2. Dorsal tubercles on short longitudinal folds.
3. Naris above the canthus.
4. Fewer or no tubercles in the interorbital region.
5. Forelimbs enlarged in breeding males, with nuptial spines on inner finger and metacarpal tubercle.
   Snout-vent length 55-62 mm.

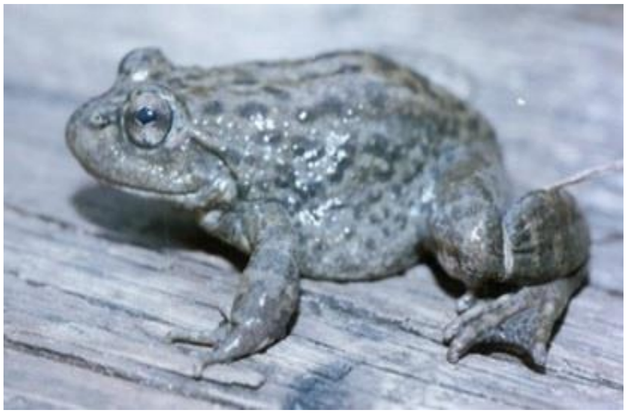


**Fig.3.18.** *Allopaa hazarensis* (Dubois and Khan).

*Colour:*
Body dorsum greyish superimposed with a network of darker color (dark olive green in life). A clear grey transverse band on the back of the head joining the posterior borders of the eyelids. Later edge of sypratympanic fold and canthus dark. Upper parts of the hind limbs with dark cross bars; hinder parts of thighs with a network of small blackish spots. Lower parts of the body and limbs whitish; throat mottled with grey. Webbing of feet greyish.

*Habitat:*
Frequents quieter and clear water pools in the bed of fast-flowing streams.

*Range:*
Known from fast-flowing streams in the Rush Valley in Hazara Division, Khyber Pakhtunkhwa, Pakistan.

### 7. *Chrysopaa sternosignata* (Murray)
**(Fig.3.19)**

1. Head much broader than long, much depressed, scarcely projecting.
2. Internarial distance greater than interorbital space, which is less than the width of the upper eyelid.
3. Tympanum not very distinct, about half the diameter of the eye.
4. Tibiotarsal articulation reaches the temple or posterior border of the eye.
5. Digits obtuse or slightly swollen at tips, toes entirely webbed, subarticular tubercles small.
6. Skin on body very loose; when the frog is on land, it is thrown in folds. Dorsum is smooth or tuberculated; tubercles are tipped with dark spines.
7. Sexually dimorphic: flanks of body of male are heavily tuberculated. Dark nuptial spines are on the first 2 fingers and the inner carpal tubercle. There is a large patch of pustules on both ventral sides of the

chest. Venter in male is tuberculated, that of female is smooth. The anterior limbs of the breeding male are considerably thickened.

Snout-vent length 88-90 mm.

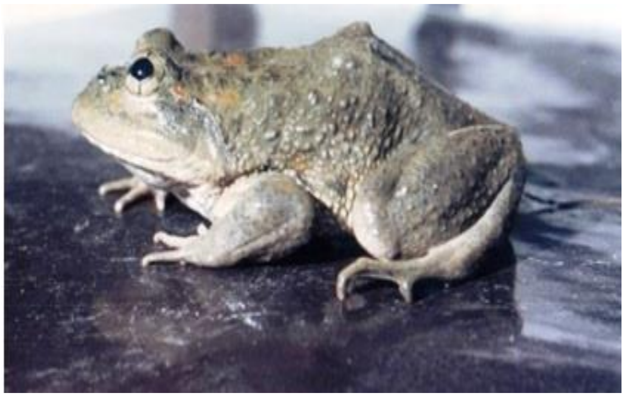


**Fig.3.19.** *Chrysopaa sternosignata* (Murray).

*Colour:*

Olive brown or dark green above, with small irregular yellow, orange, or reddish spots; ventrum white with profuse fine dark brown or black mottling. Young dark brown or olive, with blackish blotches. Pupil reduced to a narrow slit. A transverse dark streak runs across the eye, a similar vertical streak runs downward across the golden brown iris, giving the eye a peculiar appearance. This feature is also present in tadpole.

*Habitat:*

Thoroughly aquatic species, inhabiting clear pools with flowing karez water. When disturbed it jumps into the depths of the water and hides under gravel at the bottom or under dense marginal vegetation and thick floating algal cover. Never leaves water; even in freezing winter, remains sluggishly active beneath in the unfrozen water.

*Range:*

Abounds around Quetta and Mastung in karez channels, also reported from Afghanistan.

### ***8. Nanorana vicina*** (Stoliczka)
**(Fig.3.20)**

1. Naris a little nearer to the eye.
2. Tympanum indistinct.
3. First finger as long as second.
4. Toes half webbed.
5. Outer metatarsal tubercle reduced, inner narrow, feebly developed.
6. Body dorsum tuberculate, no spines.

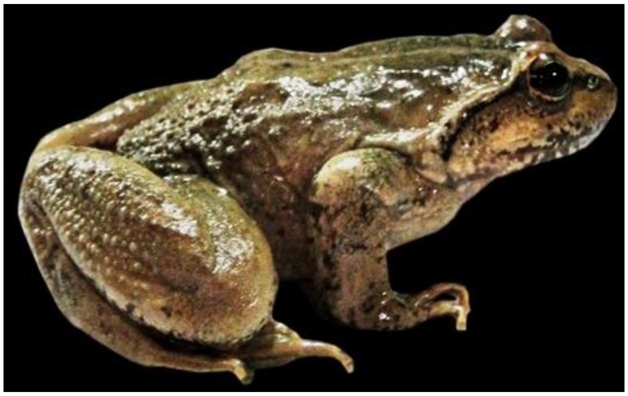


**Fig.3.20.** *Nanorana vicina* (Stoliczka).

*Colour:*

Body dorsum and limbs uniform light-olive. An indistinct sooty interrupted stripe from snout to the angle of jaws. Black mottling on lips, tympanic region, chest and posterior sides of the limbs, with indistinct dark bars on thigh and shank. Yellowish white ventrum with dusky chin and black mottling on chin and undersides of the limbs.

*Range:*

Known from Alpine Pakistan, ranges to Azad Kashmir.

### ***9. Sphaerotheca breviceps*** (Schneider)
**(Fig.3.21)**

1. Habitus short, stocky, toad-like.

2. Head broader than long, top flat.
3. First finger longer than second, tips swollen.
4. Hind limbs short, tibiotarsal articulation reaching the axilla.
5. Toes half to one fourth webbed. Inner metatarsal tubercle long, compressed, flat, shovel-shaped.
6. Skin smooth, slightly varicose, with feeble longitudinal dorsal folds.
7. Tympanum distinct, as large as eye.
   Snout-vent length 49-52 mm.

*Colour:*
Dorsum olive golden, with a light yellow median line; a well marked large golden ocellus on shoulder on each side, continuing obliquely along flanks. Indistinct yellowish bars on limbs and jaws. Sometimes dorsum is faintly mottled. Ventrum cream, gular region black in breeding male.

*Habitat:*
Inhabits relatively humid parts of Pakistan and is found in abundance along the Himalayan foothills in the northwest. It is essentially nocturnal, emerging at dusk from of its burrow which it excavates in soft sandy soil with the help of its broad shovel-shaped inner metatarsal tubercle.

*Range:* Widely ranges throughout India, Bangladesh, Nepal, Myanmar, and Sri Lanka. In Pakistan it is reported from the Himalayan foothills, and extends into the Potwar Tableland. It has spotty Range in the riparian system of Punjab, colonies are reported in desolate parts of the Cholistan Desert. Collected from the Hab and Malir River Valleys, around Karachi.

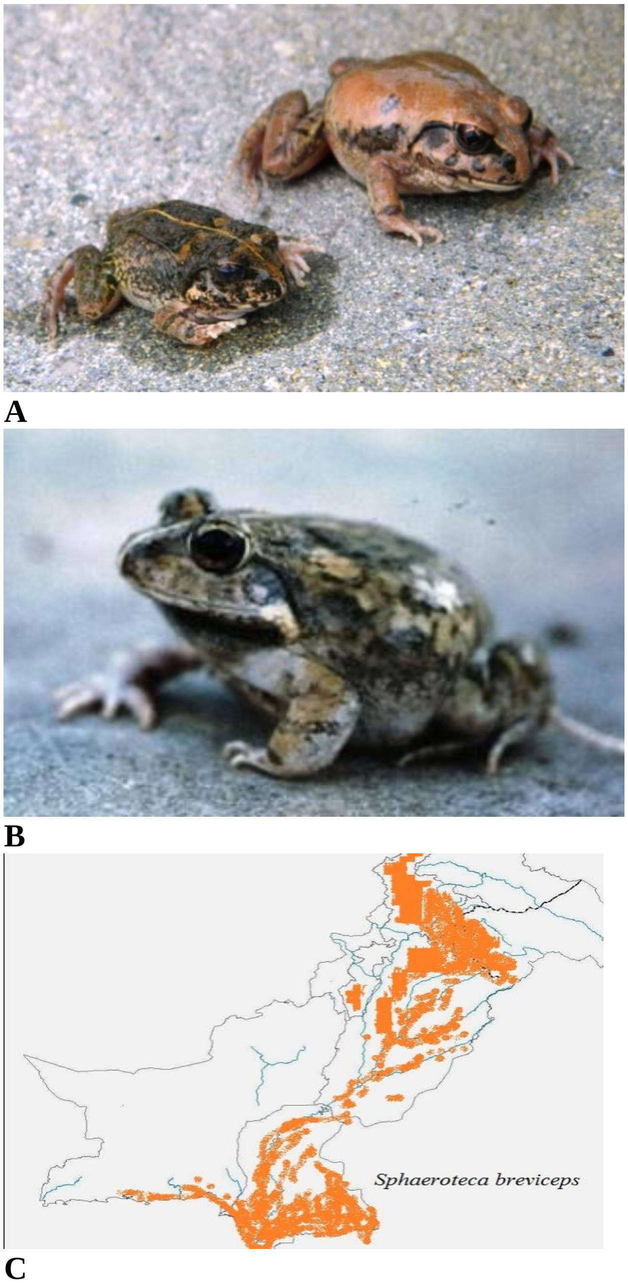
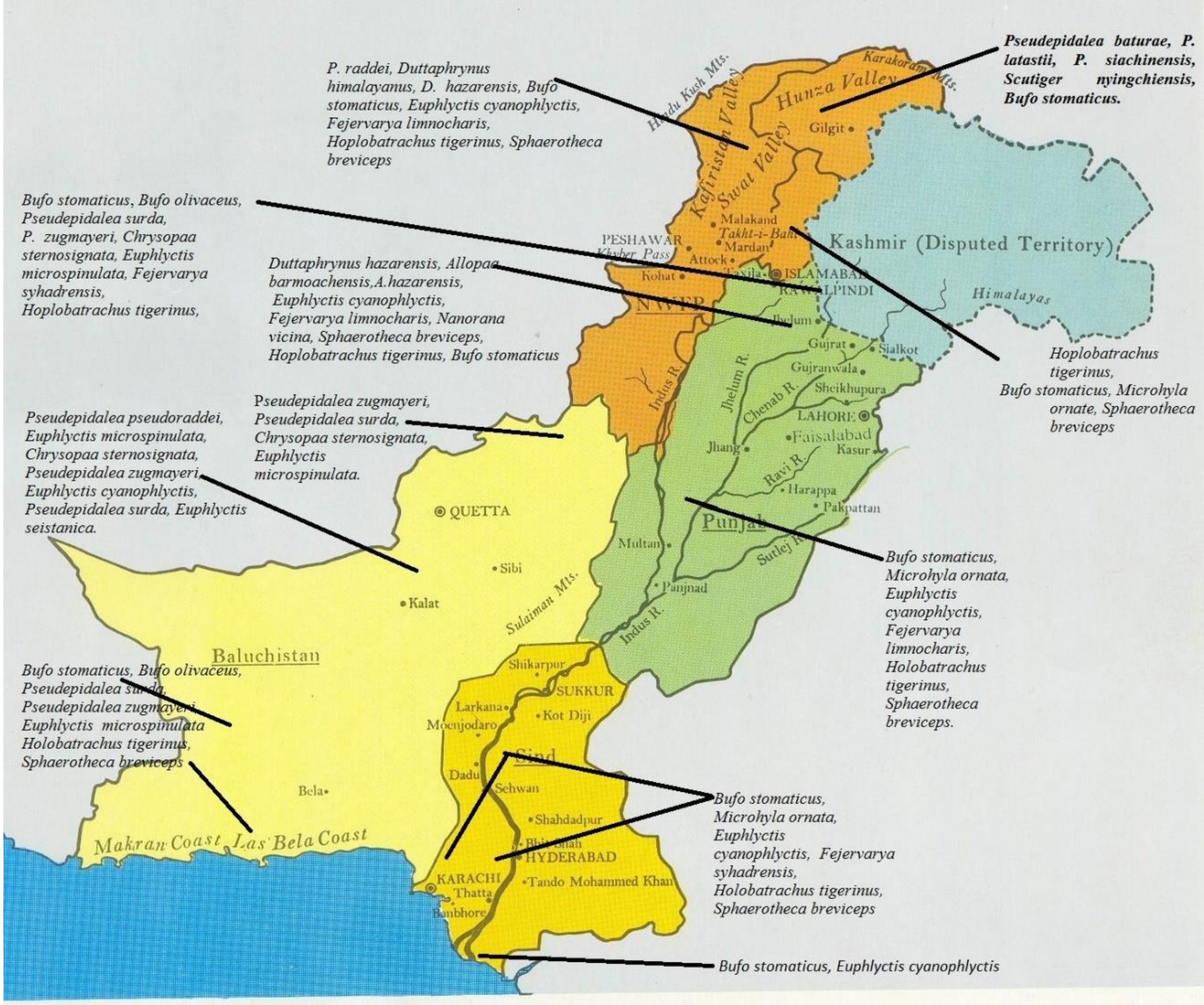


**Fig.3.21.** *Sphaerotheca breviceps* (Schneider). C shows its distribution in different parts of Pakistan.

# ZOOGEOGRAPHY



*P. raddei, Duttaphrynus himalayanus, D. hazarensis, Bufo stomaticus, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Hoplobatrachus tigerinus, Sphaerotheca breviceps*

***Pseudepidalea baturae, P. latastii, P. siachinensis, Scutiger nyingchiensis, Bufo stomaticus.***

*Bufo stomaticus, Bufo olivaceus, Pseudepidalea surda, P. zugmayeri, Chrysopaa sternosignata, Euphlyctis microspinulata, Fejervarya syhadrensis, Hoplobatrachus tigerinus,*

*Duttaphrynus hazarensis, Allopaa barmoachensis,A.hazarensis, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Nanorana vicina, Sphaerotheca breviceps, Hoplobatrachus tigerinus, Bufo stomaticus*

*Hoplobatrachus tigerinus, Bufo stomaticus, Microhyla ornate, Sphaerotheca breviceps*

*Pseudepidalea zugmayeri, Pseudepidalea surda, Chrysopaa sternosignata, Euphlyctis microspinulata.*

*Pseudepidalea pseudoraddei, Euphlyctis microspinulata, Chrysopaa sternosignata, Pseudepidalea zugmayeri, Euphlyctis cyanophlyctis, Pseudepidalea surda, Euphlyctis seistanica.*

*Bufo stomaticus, Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Holobatrachus tigerinus, Sphaerotheca breviceps.*

*Bufo stomaticus, Bufo olivaceus, Pseudepidalea surda, Pseudepidalea zugmayeri, Euphlyctis microspinulata Holobatrachus tigerinus, Sphaerotheca breviceps*

*Bufo stomaticus, Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya syhadrensis, Holobatrachus tigerinus, Sphaerotheca breviceps*

*Bufo stomaticus, Euphlyctis cyanophlyctis*

**Fig.3.22.** Geographical distribution of frogs and toads of Pakistan

## APPENDIX

| CHECKLIST | COMMON ENGLISH | ROMAN URDU | |
|---|---|---|---|
| TOADS & FROGS | Toads and Frogs | Maindak | مینڈک |
| Family BUFONIDAE | Toads | Gauk | غوک |
| *Bufo olivaceus* Blanford, 1874 | Olive Toad | Zatooni Gauk | غوک زیتونی |
| *Bufo stomaticus* Lütkin, 1862 | Indus Toad | Indus Gauk | غوک سندھی |
| *Duttaphrynus himalayanus* Günther, 1864 | Himalayan Toad | Himalayai Gauk | غوک ہمالیائی |
| *Duttaphrynus hazarensis* M. S. Khan, 2000 | Hazara Toad | Hazara Gauk | غوک ہزارہ |
| *Pseudepidalea latastii* , 1882 | Ladakh Toad | Ladakhi Gauk | غوک لدّاخی |
| *Pseudepidalea pseudoraddei baturae* Stöck, Schmid, Steinlein, & Grosse, 1999 | Batura Toad | Batura Gauk | غوک بتورا |
| *Pseudepidalea p. pseudoraddei* Mertens, 1971 | Swat Toad | Swati Gauk | غوک سواتی |
| *Pseudepidalea siacheninsis* M. S. Khan, 1997 | Siachine Toad | Siachin Gauk | غوک چین سیا |
| *Pseudepidalea surdus* Boulenger, 1891 | Iranian Toad | Irani Gauk | غوک ایرانی |
| *Pseudepidalea zugmayeri* Eiselt & Schmidtler, 1973 | Baloch Toad | Blooch Gauk | غوک چی بلو |
| Family MEGOPHRYIDAE | Tibti Frogs | Tibti maindak | مینڈک تبتی |
| *Scutiger nyingchiensis* Fei, 1977 | Tibetan Frog | Tibbiti Maindak | |
| Family MICROHYLIDAE | Narrow Mouth Frogs | Tang dahan Maindak | مینڈک دھان تنگ |
| *Microhyla ornata* (Duméril & Bibron, 1841) | Ant Frog: | Poodna Maindak | مینڈک پودنہ |
| *Uperodon systoma* (Schneider, 1799) | Marble Frog | Marmareen Maindak | مینڈک مرین مر |
| Family RANIDAE | Frogs | Maindak | مینڈک دھان فراخ |
| *Euphlyctis cyanophlyctis cyanophlyctis* (Schneider, 1799) | Skittring Frog | Tapakta Maindak | مینڈک ٹپکتا |
| *Euphlyctis c. microspinulata* M. S. Khan, 1997 | Spiny Skittring Frog | Khardar Tapakta Maindak | مینڈک ٹپکتا دار خار |
| *Euphlyctis cyanophlyctis seistanica* (Nikolski, 1900) | Seistan Skittering Frog | Seistani Tapakta Maindak | مینڈک ٹپکتا سیستانی |
| *Hoplobatrachus tigerinus* (Daudin, 1802) | Bull Frog | Basanti Maindak | مینڈک بسنتی |
| *Fejervarya limnocharis* (Boie, 1834) | Alpine Cricket Frog | Uttri Tidda Maindak | مینڈک ٹڈا شمالی |
| *Fejervarya syhadrensis* (Annandale, 1919) | Southern Cricket Frog | Dakhni Tidda Maindak | مینڈک ٹڈا سندھی |
| *Allopaa barmoachensis* (M. S. Khan &Tasnim, 1989) | Kashmir Frog | Kashmir Nadi Maindak | مینڈک ندی کشمیر |
| *Allopaa hazarensis* Dubois & Khan, M. S. 1979 | Hazara Frog | Hazara Nadi Maindak | مینڈک ہزارہ |
| *Chrysopaa sternosignata* (Murray, 1885) | Balochistan karaiz Maindak | Bloochistani Karaiz Maindak | منیڈک کاریز چستانی بلو |
| *Nanorana vicina* (Stoliczka, 1872) | Murree Frog | Marri Nadi Maindak | مینڈک ندی مری |
| *Sphaeroteca breviceps* (Schneider, 1799) | Digging frog | Khodela maindak | مینڈک یلا د کھو |

# PART-II
## TURTLES & CROCODILES

*Gavialis gangeticus*

# Chapter 4

## Chelonia & Crocodilia

Family Emydidae................................................
Family Trionychidae...........................................
Family Testudinidae............................................
Family Crocodylidae...........................................
Family Gavialidae...............................................

### Key to Families

1. Shell covered with epidermal plates ..........2
   No epidermal plates on shell......................4
2. Limbs oar-shaped, with 1-3 claws ............... ................................................ Cheloniidae
   Limbs not oar-shaped, forelimb with 4-5 claws..........................................................3
3. Digits with vestiges of web; posterior limbs more elongated, plantar surface longer than broad.................................... Emydidae
   Digits without web; feet stump-shaped,....... planter surface as broad as long .................. ................................................Testudinidae
4. Limbs with distinct digits, 3 claws present .. ................................................ Trionychidae
   Limbs without external evidence of digits, oar-shaped, clawless.......... Dermochelyidae

### Family Emydidae
### (Mud-Turtles)

***1. Geoclemys hamiltonii*** (Gray)
(**Fig.4.1**)

1 Carapace elongate, strongly convex with sloping sides, with 3 interrupted keels, formed by a series of node-like prominences on neural and costal plates.
2. First vertebral longer than broad, second and third broader than long.

3. Plastron deeply notched posteriorly, truncate anteriorly; large auxiliary and inguinal plates.
4. Head massive, snout short, posterior part of head with symmetrical large scales.
5. Digits webbed to the base of claws, limbs with broad scales.
6. Seam contact formula: 1>5<7<9<11<.
7. Plastral formula: abd>fem>pect> gul> an>hum.

   Male smaller with longer tail, arched plastron, tips of the anal plates pointed outward in female. Length 25-36 cm, weight 2-4.6 kg.

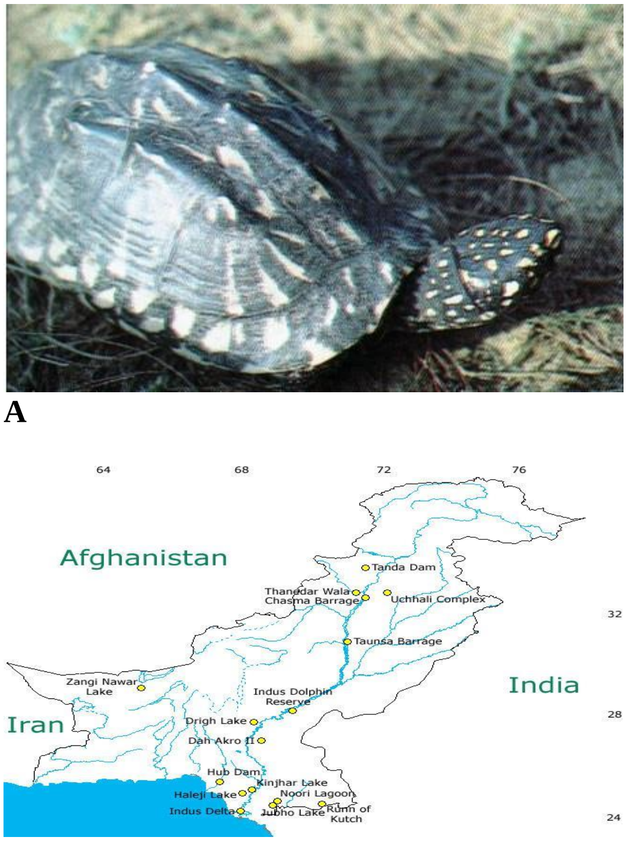


**Fig.4.1.** *Geoclemys hamiltonii* (Gray). B shows wetlands in Pakistan, natural habitats for inland turtles.

*Colour:*
Dark shell with yellow streaks and triangular marks. Dark head spotted with yellow, neck gray with white spots; dark forelimbs spotted with white.

*Habitat:*
Inhabits shallow ponds and pools, rivers.

*Range:*
Inhabits the flood plains of the Indus-Ganges-Brahmaputra. It has been reported from Nepal, Assam, Bihar, Jammu, Rajasthan, Uttar Pradesh, Western Bengal, and Jessore in Bangladesh. In Pakistan recorded from Tunsa Barrage, Saidabad, Balloki Headworks in Punjab; Jacobabad, Tharparker, and Sehwan in +Sindh.

### ***2. Hardella thurjii*** (Gray**)**
**(Fig.4.2)**

1. The carapace extensively in contact with plastron through strong long buttresses extending on to the neurals. An interrupted neural keel is present.
3. Plastron is produced posteriorly into a narrow lobe.
4. Marginals are serrated in adult.
5. Neurals are broader than long.
6. Snout projecting, skin of its posterior half smooth.
7. Jaws serrated with broad triturating surface.
8. Limbs with narrow transverse rows of scales, digits are fully webbed.
9. Seam contact formula: 1<4>6>8>11<.
10. Plastral formula: abd>pect><fem>hum> an>gul.

    Female thrice bigger than male, reaches 15-23 cm in carapace length, while male is 10-15 cm long, with tail thick at its base. Female weighs 1.5-3 kg.

*Colour:*
Carapace dark brown with a grayish black vertebral keel; plastron yellow, scutes with large blackish blotches. Four yellowish orange stripes on sides of head and a similar stripe

often present on forehead. Limbs brownish, edged with yellow.

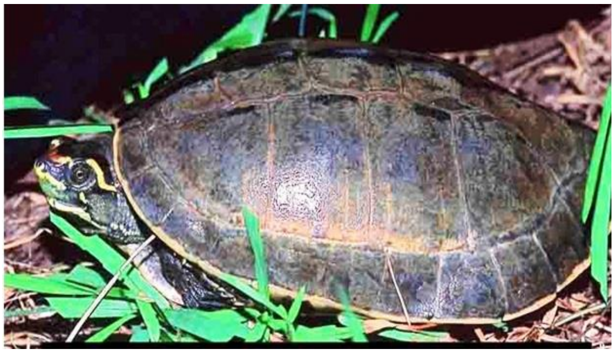


**Fig.4.2**. *Hardella thurjii* (Gray**)**.

*Habitat:*
Thoroughly aquatic, frequenting pools, ponds, canals, rivers with slow currents and lakes, seldom seen out of water, and it does not bask in winter; however, during drought it wanders in search of water and buries itself in moist debris at the bottom of drying ponds.

*Range:*
It is a widely distributed turtle in the flood plains of the Brahmaputra, Ganges, and Indus Rivers. In Pakistan it has been recorded from localities in Sindh and around Karachi.

### ***3. Kachuga smithii*** Gray
**(Fig.4.3)**

1. Carapace depressed, oval, strongly arched, highest at midpoint, margin flared, spine feeble.
2. Vertebrals longer than wide, except second and fifth which are wider than long, third quadrangular to pentagonal, 24 marginals.
3. Plastron truncated anteriorly but notched posteriorly.
4. Forehead with large irregular scales.
5. Snout projected anterior to lower jaw, upper jaw serrated, anteriorly notched.
6. Seam contact formula: 1M4>6M8<10>.
7. Plastral formula: abd>fem>hum>pect>an >gul.
   Shell length 23-24 cm.
   Male smaller than female, male has a longer tail with thick base.

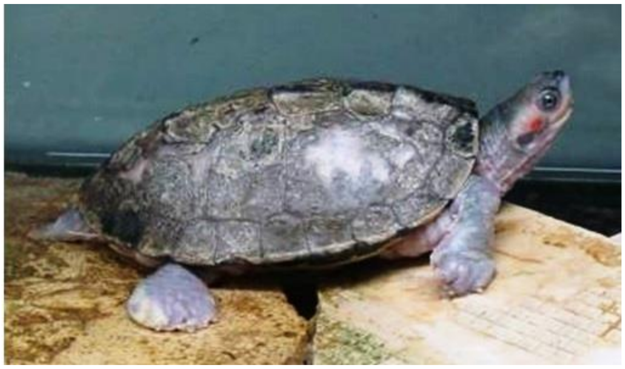


**Fig.4.3**. *Kachuga smithii* Gray.

*Colour:*
Iris pale green to blue. Carapace brown olive with black or dark brown vertebral stripe; a single, large black blotch on each plastral scute. Head olive, with a reddish brown blotch behind the eyes. Neck and limbs with yellowish blotches.

*Habitat:*
Characteristic turtle of flowing waters, however it has usually stay in lentic waters. A shy species, never attempts to bite.

*Range:*
Lower Sindh and Indus Delta, Pakistan.

### ***4. Kachuga tecta*** (Gray)
**(Fig.4.4)**

1. The carapace is dome-shaped, oval with a distinct neural spiked keel, which is more prominent on third vertebral scute; fourth vertebral is longer than wide, flask-shaped.
2. Plastron is truncate anteriorly, notched posteriorly.
3. Snout pointed, posterior half of head with

irregular scales.

4. Upper jaw serrated with concave alveolar surface.
5. Seam-contact formula: 1>4M 6M 8M l0M.
6. Plastral formula: abd>fem>an><hum> an>gul.

Maximum length 23 cm, weight 1.35 kg.

Male is smaller, has longer tail which is thicker at its base, carapace is darker, iris red; while in female the carapace is paler and iris is pink.

*Colour:*

Carapace brownish, with a light brown, red, or orange stripe along first 3 vertebrals, marginals with narrow yellow border; plastron yellow or pink, with 2-4 black marks on plastral scutes; head with an orange or reddish crescent-shaped postocular mark, curves up from eyes to meet on forehead; neck dark with narrow yellow stripes.

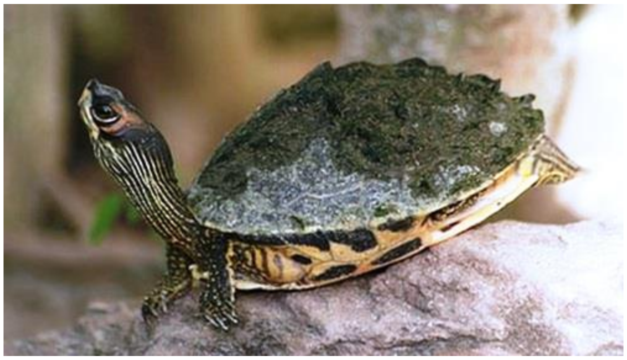


**Fig.4.4**. *Kachuga tecta* (Gray)

*Habitat:*

The sawback turtle frequents standing, slow moving water bodies and may invade large rivers. Basking turtles is a common sight during winter.

*Distribution:*

One of the most common turtles in the flood plains of the Ganges, Narmada, Brahmaputra, and Indus Rivers. It is widely distributed from Nepal, Bangladesh, and India throughout the Indus Valley in Pakistan.

## Family Trionychidae
## (Rivers and lakes)

### *1. Aspideretes gangeticus* (Cuvier)
(**Fig.4.5**)

1. Carapace low, oval, vertebral region depressed in adult.
2. Costals 8 pairs, the eighth meeting at midline, first separated by preneural and first neural plate.
3. Plastron much shorter than carapace, with 5 callosities.
4. Plastral bones strongly rugose in adult.
5. Head broad, massive, eyes dorsolateral, placed well anterior on snout.
6. Nasal septum with lateral ridges.
7. Few transversally enlarged scales on forelimbs, which have 2 claws.

Sexually dimorphic, male with longer and thicker tail, vent near the tail tip.

Maximum length 42-75 cm, weight 17 kg.

*Colour:*

Carapace dull olive to green, unicolor or with dark reticulation, plastron ivory, slightly grayish callosities; head and limbs sage green with dark mottling, head sometimes with black oblique stripes; iris greenish yellow flecked with black. Carapace of young bright green, with fine intricate black reticulation, 4 fairly distinct ocelli.

*Habitat:*

This huge soft-shell turtle inhabits rivers, lakes, and large permanent ponds where it remains buried in the bottom gravel. It is extremely aggressive, shooting out its neck to give a very painful bite. Once it gets a firm grip, it holds on and retracts its neck in an attempt to tear off what is in its jaws.

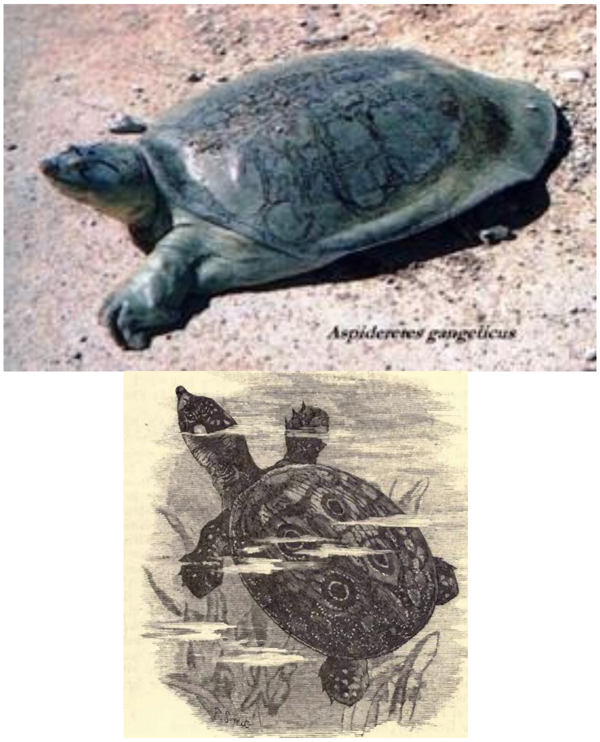


**Fig.4.5**. *Aspideretes gangeticus* (Cuvier)

*Distribution*:
This turtle is widespread in rivers, canals, and large lakes throughout the Indo-Pakistan subcontinent.

### *2. Aspideretes hurum* (Gray)
(**Fig.4.6**)

1. Carapace low, oval, with several longitudinal rows of tubercles on its posterior side.
2. A preneural and neural between first pair of costals.
3. Eighth pair of costals meet at carapace midline.
4. Plastral callosities 5, large.
5. Head large, with downward-bent snout.
   Sexually dimorphic, male with longer and thicker tail, anal aperture close to the tail tip.
   Maximum carapace length 40-60 cm.

*Colour:*
Carapace olive with yellow rim. Head and limbs olive, head with dark reticulation, and yellow blotches on snout, postocular, and tympanic regions. Plastron is light gray.

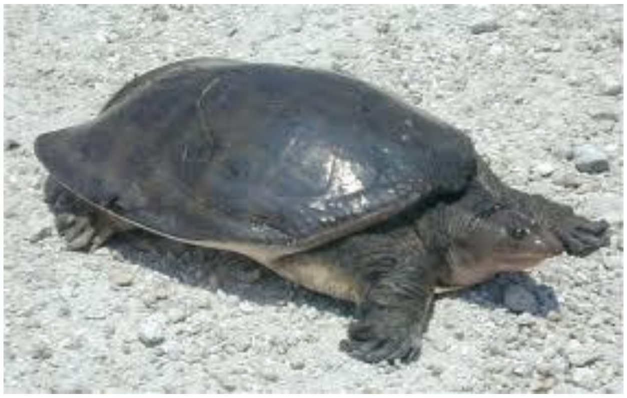


**Fig. 6.** *Aspideretes hurum* (Gray)

*Habitat:*
Little is known about the habits of this turtle. It inhabits rivers, lakes, and ponds. It is aggressive and bites with force; it is nocturnal and omnivorous.

*Distribution:*
Recorded from throughout India and Bangladesh, and in Pakistan it is known from the Indus and its tributaries.

### *3. Chitra indica* (Gray)
(**Fig.4.7**)

1. Depressed oval shell, with prominently pitted scutes.
2. Costals 8 pairs; a single neural between first pair of costals.
3. Plastral callosities 4.
4. Head extremely long and narrow, eyes situated close to the nostrils, proboscis short.
   Maximum size 35-115 cm, weight 120 kg.
   Male with longer tail which is thick at its base.

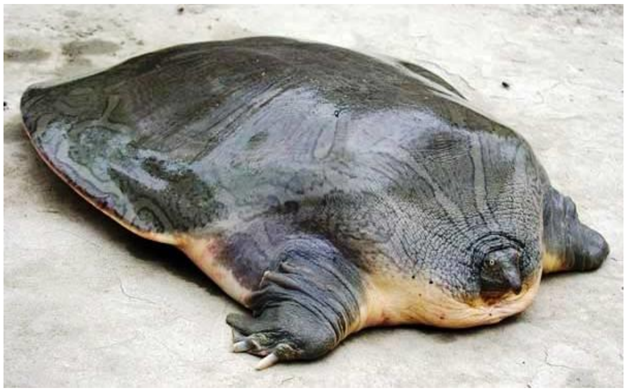


**Fig. 4.7.** *Chitra indica* (Gray)

*Colour:*
Carapace dull olive or bluish gray, with a pattern of wavy reticulations, neck, and forelimbs with similar pattern. A V-shaped mark starts from nape and extends to the carapace. Juvenile with 4 ocelli on carapace or numerous elongated black spots; plastron cream or pale pink.

*Habitat:*
This river turtle hunts in the more sandy shallow marginal parts of rivers. Its food consists of fish and crustaceans; snails have also been reported from its stomach. It is known to bury in bottom sand, keeping only its eyes exposed; as a passing fish approaches, it lunges and devours it. The dorsal pattern is an effective camouflage so that its prey is unable to detect it in natural environments. It feeds on fishes and molluscs (Das 1991),

This turtle is bad tempered; when disturbed, it lunges, when handled, it may exude a foul smell.

Clutch size ranges from 60 to 120 eggs, each having a diameter of 34 mm, and weighing 18-20 g.

*Distribution:*
This turtle is widely distributed in the river systems of the Oriental region, right from Thailand to Pakistan, where it is common in the Indus and its tributaries.

### *4. Lissemys punctata andersoni* Webb
(**Fig.4.8**)

1. Shell low, oval, scutes with fine granulation and covered with soft skin.
2. Costals 8 pairs, last pair meet each other medially.
3. A small prenuchal present.
4. Callosities on plastron 7.
5. Plastron with hinged pectoral and femoral valves, under which hind limbs are withdrawn.
6. Anterior half of the shell hinged, can close the shell completely from anterior side, with neck safely withdrawn inside shell.
7. Tail short, does not extend beyond shell.
8. Limbs with 3 claws, fingers webbed.
   Males smaller 14-20 cm, weight 4.5 kg than females 17-28 cm, weight 7 kg. Male has longer tail.

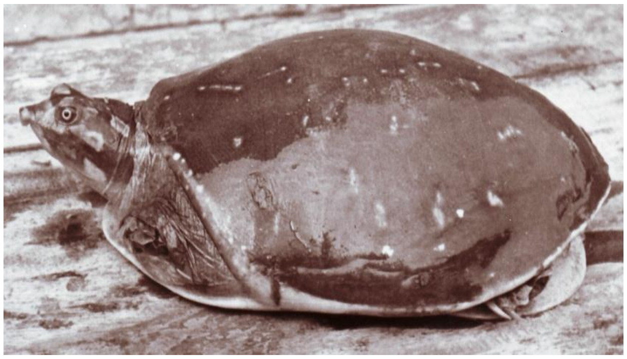


**Fig. 4.8.** *Lissemys punctata andersoni* Webb

*Colour:*
Shell light olive brown, with scattered bright yellow round dashed spots, sometimes carapace is with a yellow reticulation and edged with pale yellow; plastron cream; head and limbs gray, with bright yellow spots on head and neck.

*Habitat:*
This turtle is plentiful in the riparian system of the upper and lower Indus Valleys and

frequents muddy ditches, lakes, and marshes with considerable marginal vegetation.

*Distribution:*
*Lissemys punctata andersoni* is widely distributed in Bangladesh, Nepal, India, and Pakistan

## Family Testudinidae
(Tortoises)

.

### 1. *Agrionemys horsfieldii* (Gray)
(**Fig.4.9**)

1. Shell oblong, widest at the level of hind limbs, strongly arched, flattish at top.
2. Posterior margin of carapace distinctly flared and serrated.
3. Cervical scute long, narrow; neurals broader than long, 23 marginals, twelfth separated.
4. Plastron large, emarginated anteriorly, notched posteriorly.
5. Head moderately large, with scales on top and sides, single frontal and a large divided prefrontal.
6. Jaws not serrated, upper with 3 anterior cusps.
7. Fore- and hind limbs with 4 large claws.
8. Seam contact formula: 1>5<7<9<11<.
9. Plastral formula: Abd>gul><an>fem>pect.
   Female larger, with smaller tail. Male with concave plastron.
   Maximum size 16-22 cm, weight 1.50-3 kg.

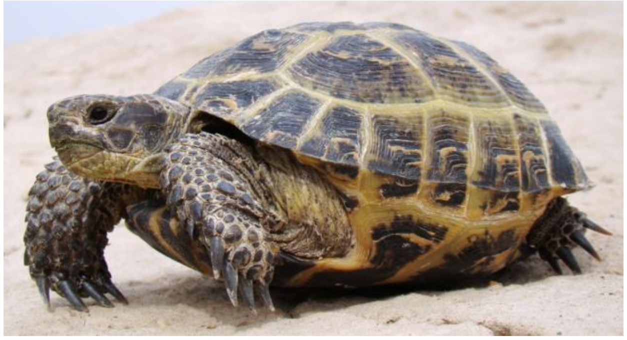


**Fig. 4.9.** *Agrionemys horsfieldii* (Gray)

*Colour:*
Carapace dark to light brown, without any definite pattern; plastron more or less diffusely and heavily clouded with dark brown; head and limbs dark gray to light yellowish; iris dark brown.

*Habitat:*
This tortoise frequents hilly and rocky terrain with clayey and sandy deserts, steppes, ephemeral communities at foothills, and semisteppes near oases.

*Distribution:*
A wide-ranging species, it is found from the Caspian Sea eastward through Khazakistan, through Iran, Afghanistan, and western China. In Pakistan it occurs throughout northern and western Balochistan and Waziristan.

### 2. *Geochelone elegans* Schopff
(**Fig.4.10**)

1. The shell is elongate, dome-shaped, flattened on sides, widest at the insertion of hind limbs. Its posterior sides are not flared.
2. Neurals and costal laminae umbovate, nuchal absent.
3. Marginals 23, the twelfth about twice the size of others.
4. Plastron with a small shallow anterior and a broad posterior notch.
5. Edges of jaws finely serrated, lower jaw with a central cusp.
6. Head with small scales, tympanum distinct.
7. Forelimbs with 5 claws, hind with 4.
8. Seam-contact formula: 1>5<6>8>11<.
9. Plastral formula: abd>hum>gul>fem>pect><an.
   Female exceeds male in body mass, male has longer tail, flattened shell top, concave plastron, and narrower postanal gap.
   Maximum carapace length 20-28 cm, weight 8 kg.

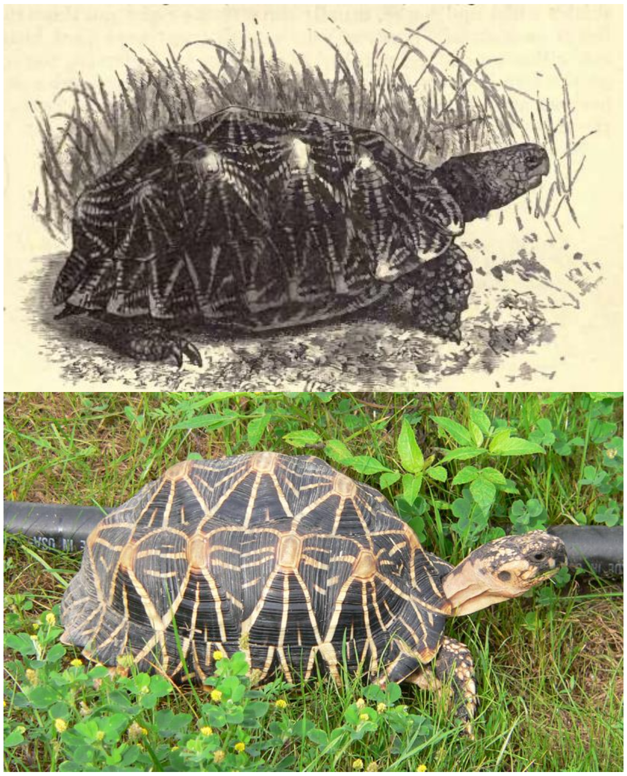


**Fig. 4.10.** *Geochelone elegans* Schopff

*Colour:*
Carapace dark brown to black; umbo on neural and costal laminae yellow with a series of 5-10 yellow stripes radiating from it; plastron plates with similar pattern; head and limbs dull yellow, spotted, mottled with black.

*Habitat:*
The star tortoise is mainly associated with dry scrub land, along the desert edge, tilled fields, grasslands, and thorn scrub wasteland.

*Distribution*:
The star tortoise is widely distributed in peninsular India and Sri Lanka. In Pakistan it is found around Karachi, where it lives in semidomesticated conditions. It has also been recorded from Kutch and Nagar Parker, southeastern Sindh.

## Family Crocodylidae

### *1. Crocodylus palustris* Lesson
**(Fig.4.11)**

1. Snout long, flat, about 60% wider than long
2. Thecodont teeth in upper jaw 19, 15 in lower jaw, on each side, fourth and tenth are the largest.
3. Postoccipital plates small, arranged in a transverse series, followed by 5 large nuchals
4. Neural plates from neck to the level of vent 18, each plate sculptured by several ridges.
5. Rectangular abdominal plates 16 across midbelly.
6. Caudal segments 33, each with a series of 4 ridged plates on dorsal side, distal half of tail with plates with a single high ridge.
7. Fingers webbed at base, toes completely webbed, emarginate; a serrated fringe along the outer side of limbs.
   Maximum total size 3 m.

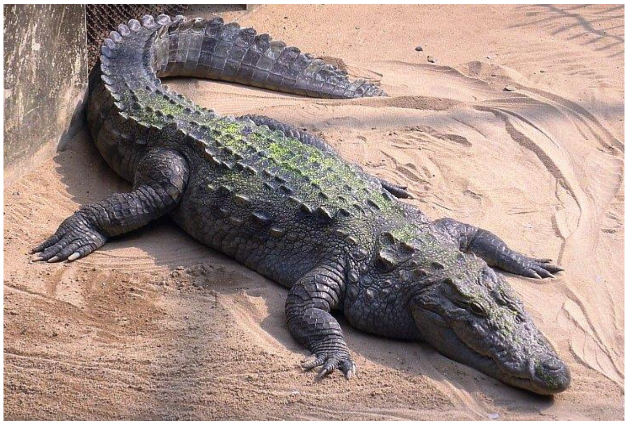


**Fig. 4.11.** *Crocodylus palustris* Lesson

*Colour:*
Dorsum light brown, with darker mottling to almost uniformly black.
*Habitat:*
The mugger inhabits rivers and lakes from plains up to 600 m of elevation. It is extremely shy; it does not like human company, and quickly takes to water. A basking mugger sits

on the sandy bank of a river, during early and late winter, facing river with its wide open mouth. It is a silent swimmer, floating quietly on the surface of 2 to 3 m deep water, with meager emergent vegetation. On land it rests on its belly, and drags it along; however, during running the belly is lifted clear off the ground. It excavates a 2-4-m long and 60-90-cm wide passage, like a burrow with a spacious terminal chamber on the banks of lakes in the Sindh Delta.

*Distribution:*

The mugger ranges from Assam through India, from Sri Lanka to westernmost Balochistan and eastern Iran. In India it inhabits all river systems and their connecting streams and all sizable ponds. While in Pakistan it is reported to inhabit the lower Indus Valley. A small group is on record in the Hub and Dasht Rivers, along the Makran coast. Few mugger are being maintained in a pond near Mangu (or mugger) Pir shrine near Karachi.

## Family Gavialidae

### ***Gavialis gangeticus*** (Gmelin)

(**Fig.4.12**)

1. Snout long, narrow, its length 5 times its breadth.
2. Teeth 27-29 teeth in the upper, 25-26 in the lower jaw on each side, first 3 fitting into notches in upper jaw.
3. A continuous series of 21-22 transverse rows of plates from nuchal to level of vent.
4. A pair of small postoccipital scutes.
5. Fingers webbed.

   Males longer than females. During breeding season, the male develops a large hollow cartilaginous protuberance at tip of its snout, known as "ghara" from which name “gharial” is derived.

   Maximum length 6.5 m.

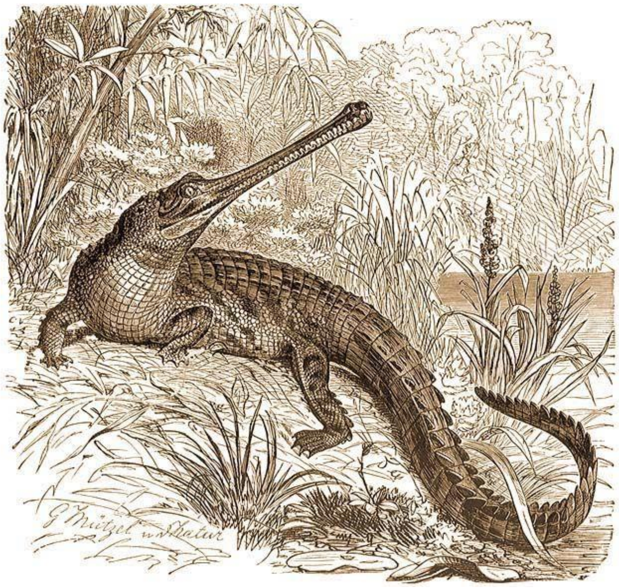


**Fig. 4.12.** *Gavialis gangeticus* (Gmelin)

*Colour*

Dark olive or brownish above, whitish or yellowish below. Young with spots or crossbars.

*Habitat:*

Restricted to deep fast-flowing rivers. About 100 years back, it was plentiful in the rivers of the Indo-Gangetic plains. Decline in its population occurred because of uncontrolled all-season hunting for hides, meat, medicine, and sport. Moreover, loss of habitat due to human activity and encroachment contributed to its extermination.

*Distribution:*

Occurs in pockets in the Gangetic plains in India. In Pakistan it is extremely rare, in not absent.

## APPENDIX
## Scientific, common English and Urdu names

| | | | |
|---|---|---|---|
| **Turtles and tortoises** | **Turtles, Tortoises** | ***Kachway*** | کچھوے |
| **Family Cheloniidae** | **Bony Shelled Turtles** | ***Haddi pusht kachway*** | ہڈی پُشت کچھوے |
| ***Caretta caretta*** (Linnaeus, 1758) | Loggerhead | *Paan Samundri Kachwa* | پان سمندری کچھوا |
| ***Chelonia mydas*** (Linnaeus, 1758) | Green Turtle | *Mongia Samundri kachwa* | مونگیا سمندری کچھوا |
| ***Eretmochelys imbricata*** (Linnaeus, 1766) | Hawksbill | *Cheel-sar Kachwa* | چیل سر سمندری کچھوا |
| ***Lepidochelys olivacea*** (Eschscholtz, 1824) | Olive Ridley | *Zatooni Samundri kachwa* | زیتونی سمندری کچھوا |
| **Family Dermochelys** | **Lathery Turtles** | ***Khal- pusht Samundri Kachwa*** | کھال پُشت سمندری کچھوا |
| *Dermochelys coriacea* (Vandelli, 1761) | Leatherback Turtle | *Khal- pusht Samundri Kachwa* | کھال پشت سمندری کچھوا |
| **Family Emydidae** | **Webbed digit fresh water turtle** | ***Jhilly ungusht*** | جھلی اُنگشت |
| *Geoclemys hamiltonii* (Gray, 1821) | Yellow-spotted mud turtle | *Chitra Daryai Kachwa* | چتکبرا دریائی کچھوا |
| ***Hardella thurjii*** Gray, 1870 | Common mud Turtle | *Daryai Kachuwa* | دریائی کچھوا |
| ***Pangshura smithii*** (Gray, 1863**)** | Brown Mud Turtle | *Bhoora Daryai Kachwa* | بھورا دریائی کچھوا |
| ***Pangshura tecta*** (Gray, 1831) | Sawback Turtle | *Dranti-pusht Kachwa* | درانتی۔ پشت کچھوا |
| **Family Testudinidae** | **Land Tortoises** | ***Khushki kay kachway*** | کچھور (خشکی کے کچھوے) |
| *Agrionemys horsfieldii* (Gray, 1844) | Central Asian Tortoise | *Wasti-Ayshai Kachoor* | وسطی ایشیائی کچھور |
| ***Geochelone elegans*** (Schopff, 1792) | Star Tortoise | *Satara Kachoor* | ستارہ کچھور |
| **Family Trionychidae** | **Lathery Turtles** | ***Khal-pusht daryai kachway*** | کھال پشت دریائی کچھوے |
| *Nilssonia gangeticus* (Cuvier, 1825) | Indian Soft-shell | *Sindhi Prait* | سندھی پریت |
| *Nilssonia hurum* (Gray, 1831) | Peacock Soft-shell | *Basanti Prait* | بسنتی پریت |
| *Chitra indica* (Gray, 1831) | Narrow-head Soft-shell: | *Tang-sar Prait* | تنگ سر پریت |
| ***Lissemys punctata andersoni*** Webb, 1980 | Flapshell Turtle | *Moonji Kachwa* | مونجی کچھوا |
| **Crocodyles and Gavials** | | | مگرمچھ اور گھڑیال |
| **Family Crocodylidae** | **Crocodyles** | ***Maggar Mach*** | مگرمچھ |
| ***Crocodylus palustris*** Lesson, 1831 | The Mugger | *Maggar Machh* | مگرمچھ |
| **Family Gavialidae** | **Gavials** | ***Ghahrial*** | گھڑیال |
| ***Gavialis gangeticus*** (Gmelin, 1789) | Gharial | *Sassar, Ghahrial* | گھڑیال، سسار |

# PART-III
## LIZARDS

*Eublepharis macularius*

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*Varanus bengalensis*

# Chapter 5

## Eublepharidae

Family Eublepharidae ..........................................

Family Gekkonidae .............................................

### Family Eublepharidae

Eyelids movable; *digits* not dilated, straight ........................*Eublepharis macularius*

### ***Eublepharis macularius*** (Blyth)

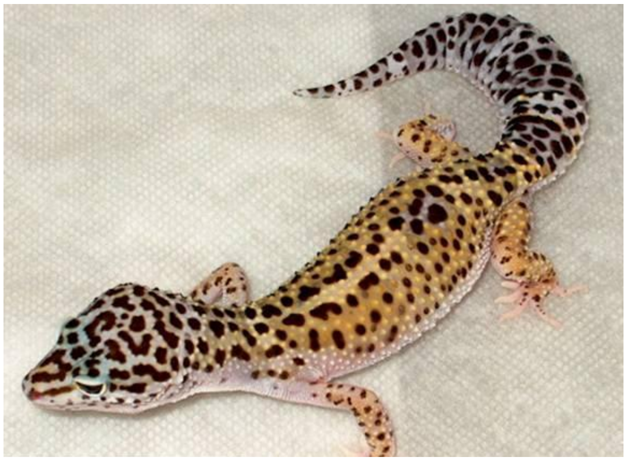
(**Fig.5.1**)

Single row of broad subdigital lamellae.
Body with granular scales, interspersed with round tubercles.
Un-regenerated tail plump, distinctly broader than body, small subcaudals.
Male 9-14 preanal pores.
Snout-vent length 120-158 mm, tail 89-93 mm**.**

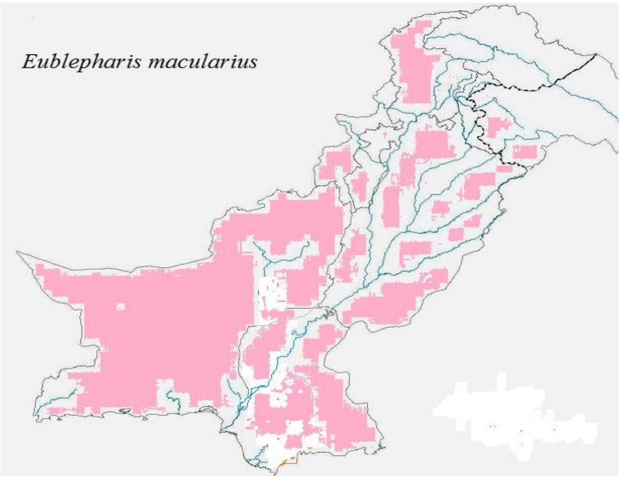
*Colour:*
Body in juvenile light brown, yellowish or pinkish with broad crossbars, sometimes with intervening dark brown spots. Head brown, tail ringed with light and dark; older specimens the bars on body are broken into spots. Head spotted, sometimes a U-shaped mark on the nape.

*Habitat*:
Common in stony country sides; inhabits rocky stony terrain, mudflats with sparse grass and bushes, in mesic to xeric conditions. Gregarious: several lizards live in colonies in holes in the ground, under stones, and crevices among rocks, especially in stone walls demarcating fields or houses.

*Range:*
From Rajputana and Khandesh District of India, in Pakistan recorded from Azad Kashmir, Khyber Pakhtunkhwa, northern Punjab, Balochistan, and lower Sindh.



**A**



**B**

**Fig.5.1.** *Eublepharis macularins* (Blyth). B shows distribution of the species in different part of Pakistan.

## Family Gekkonidae

There are 14 genera of this family in Pakistan.

1. Genus ***Agamura*** Blanford, 1874
   Long slender limbs; digits thin, cylindrical at base, distally angularly bent, slightly compressed; claws between two enlarged scales; subdigital lamellae transverse, smooth; no enlarged postmental shields; dorsal scales granular, intermixed with small round tubercles; tail cylindrical; at base strongly narrowed in diameter; not longer than snout-vent length, autotomizes only at the base; a row of more or less rounded subcaudals.

2. Genus ***Altigekko*** Khan, 2003.
   Body and tail depressed, tail a little longer than body, segments marked by lateral lobulations in the anterior half of un regenerated tail, fragile at its base, regenerated tail much swollen, caudal tubercles small, conical, protuberant given from the middle of segments, indistinct by midtail; subcaudals in several rows; postfemoral tubercles absent; dorsal granular scales convex, mostly juxtaposed, arranged in lateral transverse rows, interspersed with thrice large convex, smooth or feebly keeled oval tubercles arranged in more or less longitudinal rows, rare on head and limbs. no supracilliary spines on the posterior dorsal part of the upper eyelid; a distinct frontal and postnasal pit. Interorbital scales 16-20; scales across midabdomen 27-32, midventrals 117-150; preanal and femoral pores not indicated in both sexes (Gruber, 1981; Khan, 1992).
   Three species in Pakistan.

3. Genus ***Bunopus*** Blanford, 1874
   Digits straight, without angular bend, clawed; subdigital lamellae transverse, tuberculated; body dorsum with juxtaposed small scales, intermixed with larger keeled, slightly trihedral flattish tubercles; tail cylindrical, round in cross section, segmented, 2-3 whorls of caudal scales in a segment and one whorl of caudal tubercles, which are in close contact with each other;

enlarged subcaudals may be present or absent; enlarged postmental may be present or absent; male with 4-6 preanal pores.

Anderson (1999) determined the holotype of *Crossobamon lumsdeni* as *Bunopus tuberculatus.*

A single species represented in Pakistan.

4. Genus ***Crossobamon*** Boettger, 1888

Digits straight, comb like scales projecting on each side; transverse multileveled subdigital lamellae; dorsum with small imbricate keeled scales intermixed with larger flattish keeled tubercles; no distinct postmental scale; preanal pores in male present.

Three species represented in Pakistan.

5. Genus ***Cyrtopodion*** Fitzinger, 1843

Dorsum with typical trihedral tubercles arranged in regular longitudinal rows, bigger than interspaces between them; caudal tubercles mucronate, laterally broadly in contact with each other; male with preanal, rarely with femoral pores; a single row of transversally enlarged subcaudals (Khan 2001a). There have been several attempts to group these geckos (Annandale 1913; Smith 1935; Szczerbak and Golubev 1986; Khan 2001a; Khan and Rosler 1999; Anderson 1999).

6. Genus ***Hemidactylus*** Oken, 1817

From dilated basal part of digits distal phalanges arise angularly, digits covered with scales, not denticulate; all digits clawed; dorsum with uniform granular subimbricate scales, some times mixed with round enlarged tubercles.

Seven species known from Pakistan.

7. Genus ***Indogekko*** M. S. Khan, 2003

Sand-stone geckos (Khan, 2001). Large, thin geckos, with body and tail depressed, tail quadrangular, fragile at any point along its length, much longer than body, with very gradual taper; three rows of flat, keeled laterally flared caudal tubercles, twice broadened subcaudals in a single series, two to a segment, laterally flanked by a row of elongated scales; supracilliary spines present on the posterior dorsal part of upper eyelids; limbs and digits long, tips of fingers reach snout tip or beyond. Dorsal granular scales flat, pentagonal, juxtaposed, laterally arranged roughly in transverse rows, interspersed with 2-3 times larger, flat, round to oval, smooth or slightly keeled tubercles. Interorbital scales 13-18; 2, mostly 3 pairs of postmentals, first in contact by a long suture; scales across mid abdomen 23-28; mid ventral scales 129-132; postfemoral tubercles absent; a continuous series of 4-9 preanal and 6-9 femoral pores in male (in some species female may have preanal and femoral pores).

Four species in Pakistan.

8. Genus ***Mediodactylus*** Szczerbak and Golubev, 1977

*Diagnosis*:

Male with no more than 10 preanal pores, no femoral pores; first pair of postmentals in contact; dorsal tubercles oval or roundish, smooth; caudal tubercles spiny, do not contact each other; a row of enlarged subcaudals; supracilliary spines present.

A single species in Pakistan.

9. Genus ***Ptyodactylus*** Goldfuss, 1820

Digits free, cylindrical at base, tips strongly dilated laterally; a series of subdigital lamellae under cylindrical basal part, while two diverging series on distal dilated part, a small fissure between two series; claws

retractile between scales in the anterior notch in the apical expansion; dorsum with smooth juxtaposed, uniform granular scales, abdomen with subimbricate scales; tail subcylindrical, tapering.
A **s**ingle species known from Pakistan.

10. Genu**s** ***Rhinogekko*** de Witte, 1973
Nostrils are carried at the tip of a prominent cylindrical caruncle on lateral side of snout, formed by three nasal and first supralabial, which are drawn into a prominent narial spout; digits straight, cylindrical, slightly compressed, with a row of smooth transverse lamellae; a row of enlarged subfemoral scales; tail thin, cylindrical, with a row of irregular squarish larger subcaudals; male with preanal pores. The morphology of narial region of these geckos is enough to distinguish them from rest of the geckos.
One species occurs in Pakistan.

11. Genus ***Siwaligekko*** M. S. Khan, 2003
*Tibetanus* subgroup (Khan, 2001). Medium size geckos. Body and tail plump, nearly round, shorter or subequal of body, not whip-like, segmentation indistinct, indicated by minute blunt 2-3 tubercles in anterior half of the tail; tail fragile at base, regenerated tail not swollen, subcaudals indistinct; no supracilliary spines on the posterior dorsal part of the upper eyelids; dorsal granular scales round to polygonal, juxtaposed, beaded (convex), interspersed with three to four times large beaded smooth or slightly keeled tubercles, extending on neck and head, absent from limbs; postfemoral tubercles absent; interorbitals 21-35; midabdominals 36-56; midventrals 149-205; subdigital lamellae under basal part of digits somewhat broad, those under angular part narrower; subdigital lamellae under 4th toe 14-21; male with 8-10 preanal pores, no femoral pores, both absent in female.
Three species in Pakistan

12. Genus ***Teratolepis*** Günther, 1870
Subdigital lamellae keeled, not divided; supranasal scales large, flat, does not line nostril; body with flat, rhomboid, imbricate, keeled or smooth scales; dorsal and abdominal scales subequal; no distinct subcaudals; tail cylindrical, slightly thicker and flat at the base, thinning at its last quarter, covered above and below by flat imbricate scales.
A **s**ingle species occurs in Pakistan.

13. Genus ***Teratoscincus*** Strauch, 1863
Digits straight, not bent or dilated, all clawed, with a lateral fringe of long pointed scales; subdigital surface with minute granules; body covered with uniform, cycloid, imbricate scales; tail covered above with large flat nail like transverse plates; male without preanal and femoral pores.
Two species occur in Pakistan.

14. Genus ***Tropiocolotes*** Peters, 1880
Small geckos, rarely exceeding 35 mm in snout-vent length; digits with slight angular bent, cylindrical, without a fringe, with a single series of transverse subdigital lamellae; dorsum with small, uniform, homogenous imbricate scales; postanal sacs present; in male preanal and femoral pores absent.
Three species in Pakistan.

**Key:**

1. Digits dilated ............................................2
   Digits not dilated ....................................10
2. Dilated part of the digit confined to the terminal phalanx .*Ptyodactylus homolepis*
   Dilated part of the digit extends along the whole digit ...............................................3

3. Tail swollen, covered with large flat imbricate scales; subdigital lamellae undivided ..................... *Teratolepis fasciata*
Subdigital lamellae divided ....................... 4

4. Dorsum with keeled enlarged tubercles, arranged in regular rows ............................ 5
Dorsum with hemispherical keelless tubercles irregularly arranged or absent ........ 8

5. Dorsal pattern of clearly defined broad dark saddles...................... *Hemidactylus triedrus*
Dorsal pattern of small spots, or uniformly colored ....................................................... 6

6. Six to 10 lamellae under 4th toe, males with precloacal and femoral pores.......................... *Hemidactylus brookii*
Nine to 15 lamellae under 4th toe; males with precloacal pores only ......................... 7

7. Eleven to 15 lamellae under 4th toe; 6 to 9 precloacal pores .......*Hemidactylus persicus*
Nine to 12 lamellae under 4th toe; 4 to 6 precloacal pores ....... *Hemidactylus turcicus*

8. Inner toe less than half the length of second toe; a continuous series of 23 to 33 preano-femoral pores ...........*Hemidactylus frenatus*
Inner toe more than half the length of second toe; precloacal and femoral pores separated by at least six scales ................... 9

9. Dorsum with tubercles; 20 or more femoral pores; 12 or fewer lamellae under 4th toe ...................*Hemidactylus leschenaultii*
No dorsal tubercles; femoral pores 15 or less; 12 to 15 lamellae under 4th toe ......................*Hemidactylus flaviviridis*

10. Digits straight.......................................... 11
Digits angularly bent between last and penultimate phalanx................................ 16

11. Toes fringed on sides with pointed flexible long scales............................................... 12
Toes not fringed so…*Bunopus tuberculatus*

12. Several series of large, thin scales on tail dorsum; habitus robust............................. 13
Tail dorsum with small scales; habitus slender..................................................... 14

13. Body with large cycloid scales, 30 to 35 round midbody ......... *Teratoscincus scincus*
Body scales small, 100 or more round midbody ............. *Teratoscincus microlepis*

14. Unregenerated tail shorter than body; in male fewer than five precloacal pores ...................... *Crossobamon orientalis*
Tail longer than body; precloacal pores six or more ....................................................15

15. Dorsum with numerous tubercles; dorsal pattern of transverse bands.......................... ......................... *Crossobamon lumsdeni*
Few or no dorsal tubercles; dorsal pattern of longitudinal stripes.......................................... .......................... *Crossobamon maynardi*

16. Body and tail depressed; tail longer than body.........................................................19
Body and tail cylindrical, equal or subequal in length....................................................17

17. Three nasal scales; dorsal pattern of transverse bands which are much narrower than interspaces, tending to break in spots on sides........................ *Siwaligekko mintoni*
Two nasal scales; dorsal pattern of transverse bands, band as broad or broader than interspaces ........................................18

18. Dorsal bands broader than interspaces; mid-ventrals 85 to 162 ................................ ........................ *Siwaligekko dattanensis*
Dorsal bands breaking into a reticulum; mid-ventrals 194 to 205 .............................. ......................... *Siwaligekko battalensis*

19. Tail with even taper; limbs small, heel not reaching axilla ..........................................22
Tail tapering abruptly; limbs long and slender; heels reaching axilla or beyond .... 20

20. Nasal scales strongly projecting vertically carrying naris at higher level....................... ........................... *Rhinogekko misonnei*
Nasal scales not as above .........................21

21. A row of enlarged scales under the thigh; tail longer than snout-vent length ............................*Rhinogekko femoralis*
No enlarged scales under thighs; tail

shorter than snout-vent length .................... ................................. *Agamura persica*

22. Body non tuberculated............................ 23
    Body tuberculated.................................. 24
23. Internasals not differentiated from surrounding scales; four scales border naris...................... *Tropiocolotes depressus*
    Internasals well differentiated, followed by a second pair of large scales; 5 scales border naris ............. *Tropiocolotes persicus*
24. Trihedral tubercles on body and tail; body moderately depressed .............................. 25
    Trihedral tubercles on tail only; body much depressed................................................ 31
25. Interspaces between tubercles much smaller than size of the tubercles............. 26
    Interspaces as large as or larger than size of the tubercles ............................................ 27
26. Interorbital scales more than 14; dorsal tubercles usually in contact with each other; mid-ventrals more than 120; snout-vent length less than 48 mm ....................... ........... *Cyrtopodion montiumsalsorum*
    Interorbital scales less than 14; dorsal tubercles always separated by 1 to 3 granular imbricate scales; midventral scales less than 120; snout-vent length more than 50 mm ............ *Cyrtopodion kohsulaimanai*
27. Two whorls of subcaudals to a caudal segment................................................... 28
    Three whorls of subcaudals to a caudal segment ............. *Cyrtopodion agamuroides*
28. Subcaudals small, as broad as long, in two rows....................... *Cyrtopodion kachhense*
    Subcaudals broader than long, in a single row ........................................................ 29
29. Scales across mid-abdomen less than 25 .......................... *Cyrtopodion scabrum*
    Scales across mid-abdomen more than 25 ..30
30. 25-33 scales across mid-abdomen ................... *Cyrtopodion potoharensis*
    30-40 scales around mid- abdomen ............ ........................... *Cyrtopodion watsoni*
31. Caudal tubercles trihedral, arising from last annulus of caudal segment .......................32
    Caudal tubercles non-trihedral, arising from center of caudal segment .................35
32. Only precloacal pores present in males ......................................................33
    Precloacal and femoral pores present in males ......................................................34
33. Flat dorsal tubercles keeled.......................... ............................ *Indogekko indusoani*
    Dorsal tubercles feebly keeled or keelless .....................*Indogekko fortmunroi*
34. 16-18 scales across mid-abdomen; 92-106 midventral scales...... *Indogekko rhodocaudus*
    21-25 scales across mid-abdomen; 102-132 midventral scales.....*Indogekko rohtasfortai*
35. Dorsal tubercles round with raised center ......................................................36
    Dorsal tubercles flat, with or without keel .........................................................37
36. Unregenerated tail flat, laterally deeply sected, subcaudals Indistinct ....................... .................................*ltigekko stoliczkai*
    Tail quadrangular, a distinct row of subcaudals .................. *Mediodactylus walli*
37. 158-171 midventrals....*Altigekko baturensis*
    109 mid-ventrals............*Altigekko boehmei*

### ***1. Agamura persica*** (A. Duméril)
**(Fig.5.2)**

Femoral and preanal pores absent; femoral if present, not more than four.

Ventral scales in 23-26 rows across midabdomen.

Tail as long as body, tip blunt.

Snout-vent length 65 mm, tail 65 mm.

*Colour:*

Dorsum light gray with yellowish tinge. Five dark gray crossbars on body, as broad as or slightly narrower than interspaces, 9-10 on tail. Belly dirty white, flecked with gray. In young, bands darker dotted with light.

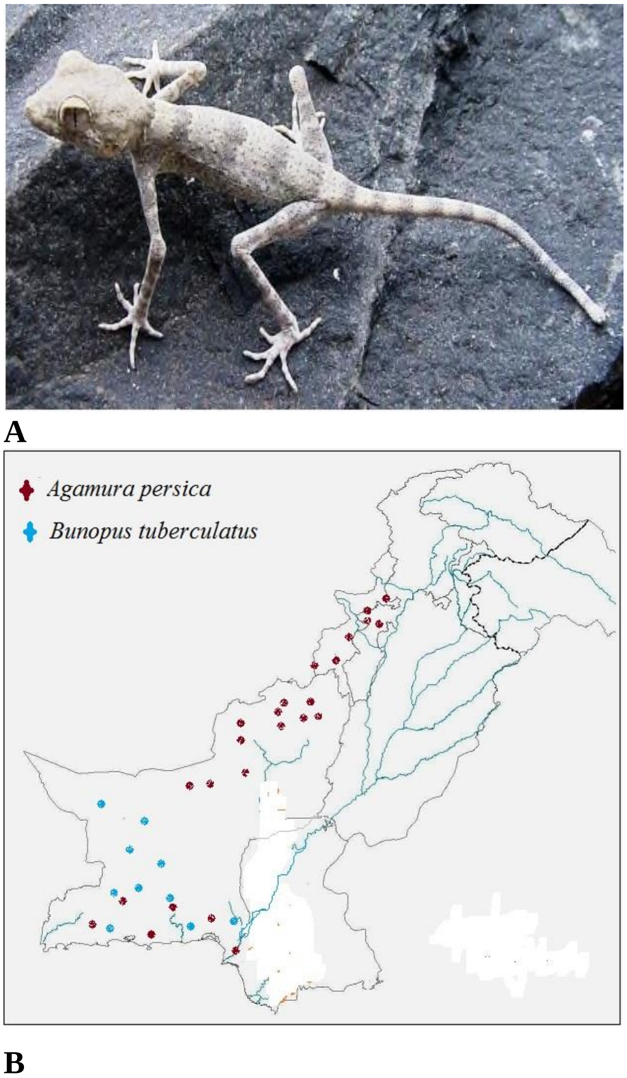


**Fig.5.2.** **A**, *Agamura persica* (A. Duméril). B, shows distribution of *Agamura persica* in different regions of Pakistan.

*Habitat*:

Collected from rocky, stony terrain close to sandy semi-desert, and in crevices on the slopes of hills at 30-100 m of elevation. The gecko is sluggish, essentially nocturnal, however, may be active during the day.

*Range:*

Reported from Iran, and extends eastward to near Karachi and northward to the Waziristan Hills, between 25 and 100 m of elevation.

### ***2. Altigekko baturensis*** **(**Khan and Baig**)**

### **(Fig.5.3)**

Interorbitals 16-20.

Dorsal granular scales interspersed with flat thin weakly keeled tubercles, in 11-12 longitudinal rows at midbody.

Scales across midabdomen 26-30.

Scales along body midventrum 149-171.

No preanal or femoral pores.

Caudal tubercles flat, arising from the middle of tail segments.

Subcaudals small.

Snout-vent length 50-53 mm, tail 51-54 mm.

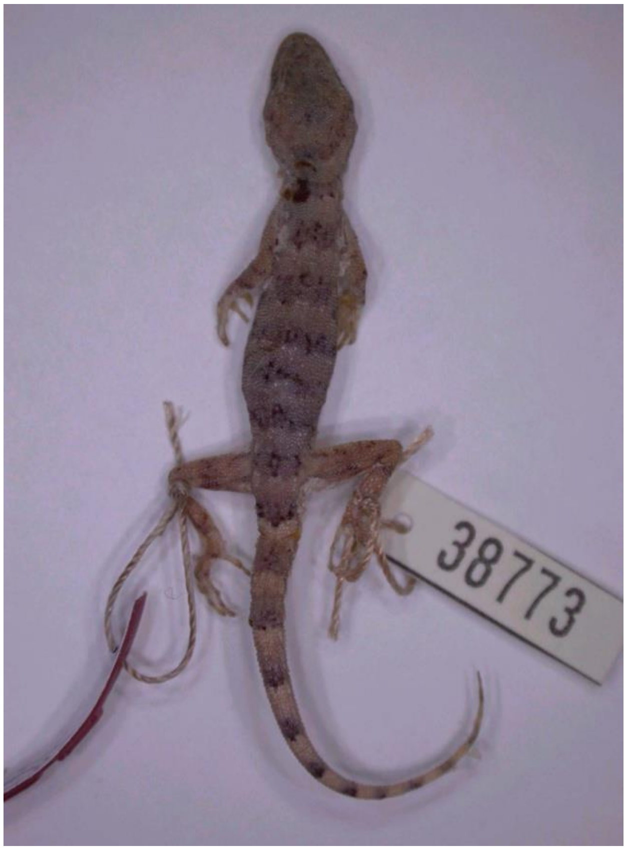


**Fig.5.3.** *Altigekko baturensis* **(**Khan and Baig**)**

*Colour:*

Dorsum light gray, with wavy-margined faint transverse bars on nape, neck, 4 on body, one at the pelvis and the last one at the level of the vent. Tail with transverse dark bars.

*Habitat*:
Picked from crevices in stone wall of thatched huts, from under stones and other debris in an area of sparse grass and low bushes.

*Range:*
Gilgit Agency, northeastern Pakistan.

### ***3. Altigekko boehmei*** (Szczerbak)

Supralabials 8-9; infralabials 6-7; interorbitals 20; nasals 3; postmentals in three pairs, scales of first pair broadly in contact with each other.
Midventral scales 109-112.
Finger tips of adpressed forelimbs reach to snout tip, toes of hind limbs to mid-neck; 22 subdigital lamellae under 4th toe. Snout-vent length 34-39 mm, tail length 35-50.

*Colour:*
Body light dark with 6-7 darker transverse bands, 11-12 similar bands on tail.

*Ecological notes:*
A gecko of snowfields, inhabiting holes and crevices among walls of stone built huts and houses.

*Range:*
Known from Skardu, Ladak, northeastern Pakistan, at 2300 m.

### ***4. Altigekko stoliczkai*** (Steindachner)
(**Fig.5.4**)

Body and tail moderately depressed, tail a little longer than body, laterally deeply sected in anterior half.
Subcaudals in several series.
Body with flat, mostly juxtaposed granular scales, arranged in transverse rows, interspersed with flat smooth oval tubercles, about three times larger than granular scales.
Interorbital tubercular scales 16-20.
27-32 scales across midabdomen, 117-150 midventral scales from postmentals to anterior lip of cloaca.
Both preanal and femoral pores not indicated.
Snout vent length 48, tail length 52 mm.

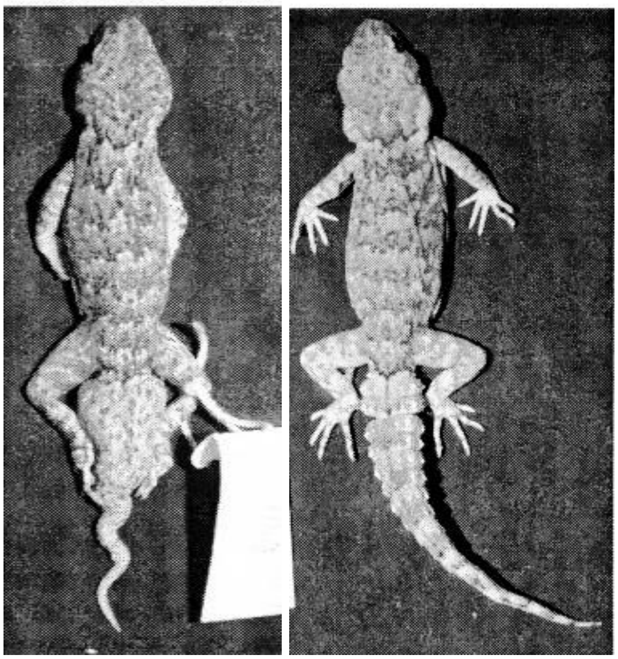


**Fig.5.4.** *Altigekko stoliczkai* (Steindachner)

*Colour:*
Body light blue or gray, with pink edged transverse irregular bands, with denser wavy posterior edges, broader than interspaces: three on nape, six on body and 13 on tail (on preservation bands are dark). Head, labials and tail plates with fine gray dots, limbs and digits barred, ventrum light.

*Ecological Notes:*
Collected from rocky habitat, in bare, dry situations in the non-irrigated areas without or with very sparse vegetation, apparently avoiding direct neighborhood of human settlements.

*Range:*
Widely distributed in Baltistan, northeast

Pakistan. Recently it has been recorded from upper Indus

### *5. Bunopus tuberculatus* Blanford
(**Figs.5.5 & 5.2B**)

No postmental.
Digits straight, distal phalanx not compressed.
Subdigital lamellae with a single series of minute tubercles.
Male with 5-6 preanal pores.
Snout-vent length 50-52 mm, tail 59-60 mm.

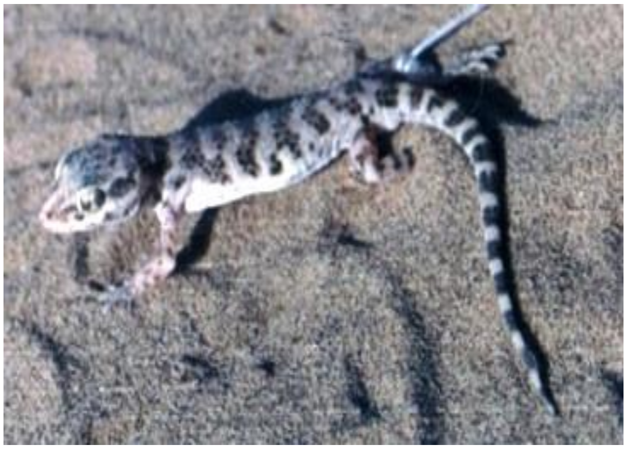


**Fig.5.5.** *Bunopus tuberculatus* Blanford

*Colour:*
Dorsum light grayish to pale brown, with 6 indistinct light gray crossbars, broader than interspaces. A brown crescentic curve around nape passes through eye. Labials barred. Limbs mottled or barred. Tail barred above, flecked below, belly white.

*Habitat*:
A true psammophilous essentially a nocturnal species, extracted from burrows among roots of shrubs in sand dunes. In mountainous region with sandy soil, inhabits crevices in the rock or brick walls of dikes built around salt lakes known locally as "*hamuns",* crevices under bridges, and fissures in soil.

*Range:*
Ranges from Syria, Iraq, eastern Arabia, southern Iran, to southern Afghanistan. In Pakistan it is common in Balochistan, to southern Sindh, Las Bela, and around Hyderabad, below 2000 m.

### *6. Crossobamon lumsdeni* (Boulenger)
(**Fig.5.6**)

Length of snout greater than distance between eye and ear opening.
Hind limb reaches beyond axilla.
Abdominals smooth.
Dorsal tubercles numerous.
Head with irregular scales.
Snout-vent length 33-38 mm, tail 40-42 mm.

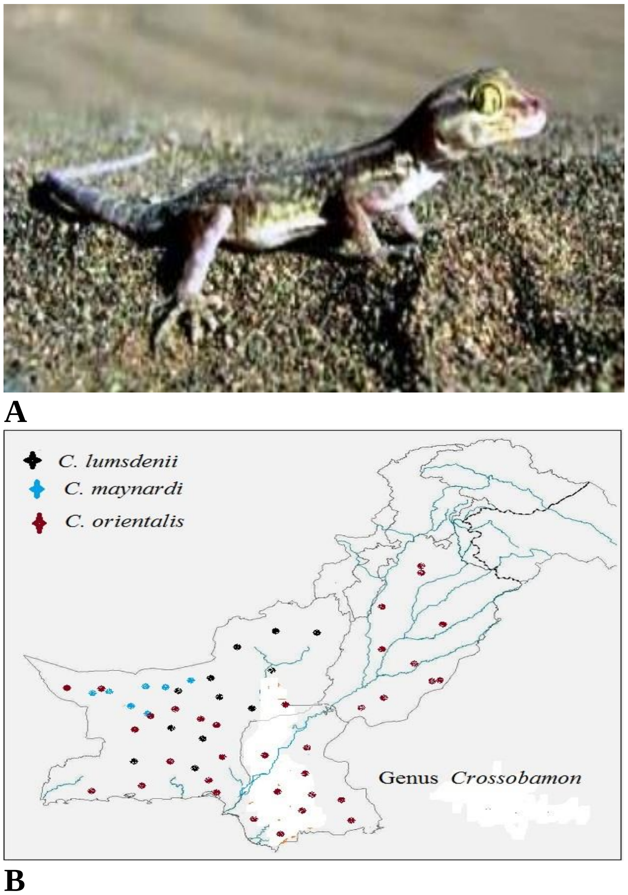


**Fig.5.6.** *Crossobamon lumsdeni* (Boulenger). B, shows distribution of species of Genus *Crossobamon*

*Colour:*
Dorsum sandy gray, with 7 distinct brownish crossbars, which are broader than interspaces. Body ventrum white.

*Habitat*:
A true psammophilous essentially a nocturnal species. It lives in burrows at the roots of bushes and grass among packed and semi-packed sand dunes., and feeds on different arthropods and their larvae.

*Range:*
Recorded in Pakistan between Nushki and Helmand in northern Balochistan.

### *7. Crossobamon maynardi* (Smith)
(**Figs.5.7 & 5.2B**)

Snout is longer than distance between eye and the ear opening.
Supralabials13-15, infralabials 12-13.
Belly with small round keeled scales.
Hind limb reaches to axilla.
Toes with marked lateral denticulations.
Male with 9 preanal pores, female with 9 enlarged pitted scales.
Snout-vent length 69-70 mm, tail 75-76 mm.

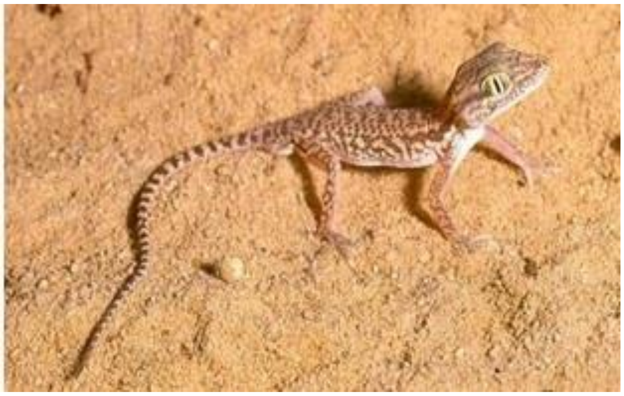


**Fig.5.7.** *Crossobamon maynardi* (Smith)

*Colour:*
Three yellow irregular stripes, with brownish black bands, from head to tail. Ventrum slightly pinkish.

*Habitat*:
It excavates burrows in the roots of vegetation and feeds on desert arthropods. When encountered it runs to the nearby shelter, spraying sand behind.

*Range:*
The striped sand gecko has been collected from northwestern Balochistan.

### *8. Crossobamon orientalis* (Blanford)
(**Fig.5.8**)

Snout about as long as distance between eye and the ear opening.
Supralabials 11-13, infralabials 9-11.
Head scales fairly uniform, flat or feebly keeled.
Abdominal scales small, round and keeled.
Hind limb reaches to the axilla.
Toes long, with well-marked lateral denticulations.
Male with 1-4 preanal pores.
Snout-vent length 47-49 mm, tail 48-50 mm.

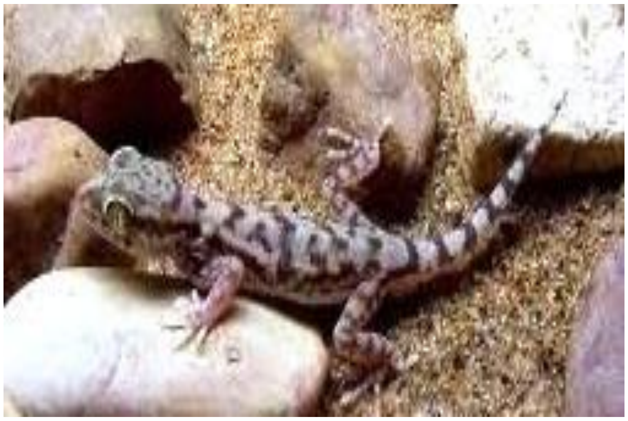


**Fig.5.8.** *Crossobamon orientalis* (Blanford)

*Colour:*
Dorsum pale sandy, with indistinct dark crossbars. A dark line from eye to the sides of the body. Dorsal tubercles dark brown. Ventrum whitish.

*Habitat*:
Its burrows in open sand close to vegetation, the burrow has a large round opening. Most of the day it stays close to the opening, catching passing insects.

*Range:*
Widely distributed throughout the Thar, Cholistan, and Thal Deserts, Sindh Delta and Las Bela, southern Balochistan.

### ***9. Cyrtopodion agamuroides*** (Nikolsky)
**(Fig.5.9)**

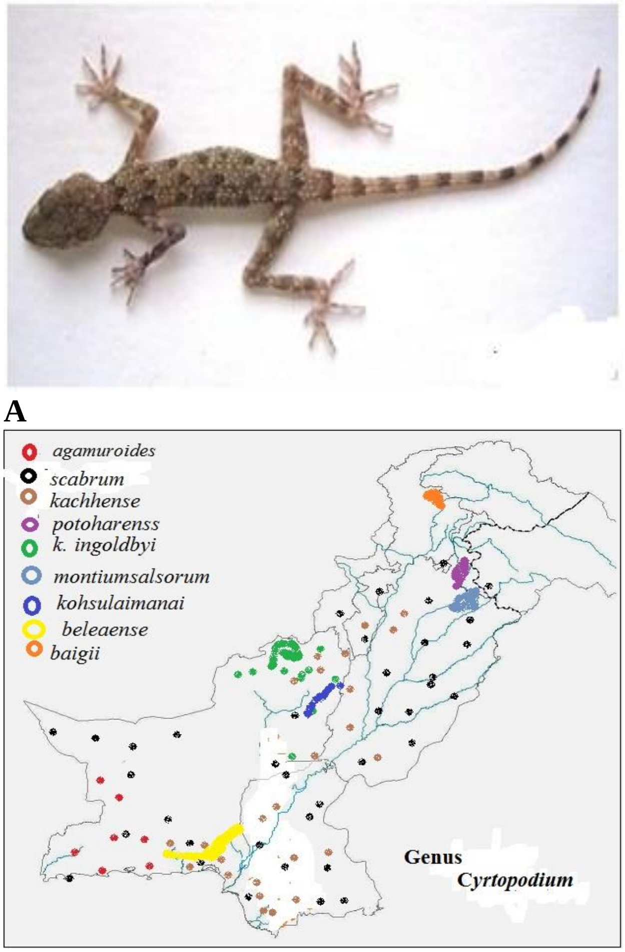


**Fig.5.9.** *Cyrtopodion agamuroides* (Nikolsky). B shows distribution of various species of Genus *Cyrtopodion*

Nasal scales 3.
Scales with preanal pores are much larger than surrounding scales.
Transverse rows of subcaudal scales under a caudal segment 3.
Scales across midbelly 28.
Male with 2-4 preanal pores.
Snout-vent length 38-40.2 mm, caudal length 49-50 mm.

*Colour:*
Khaki brown dorsum with 7 cross rows of 3-5 dark brown spots arranged between neck and the level of vent. Tail with 13 thick bars; 4-5 bars on limbs; ventrum white.

*Habitat*:
Collected from different situations in barren scrubland to rocky cliffs. It is nocturnal and very agile on rocks during the night, jumping from one rock on to another.

*Range:*
From southeastern Iran to Las Bela.

### ***10. Cyrtopodion kachhense kachhense***
(Stoliczka)
**(Fig.5.10)**

Subcaudals small, not broader than adjacent scales.
Scales across midabdomen 30.
Dorsal tubercles subtrihedral.
Snout-vent length 37-40 mm, tail 40-45 mm.
*Colour:*
Dorsum yellowish gray, with irregular dark brown spots, tail barred.

*Habitat*:
It lives in cracks and holes in ground, readily colonizing crevices among rocks and nearby houses, and crevices under bridges and walls.

*Range:*
Collected from most of Kutch, coastal Sindh, and Las Bela, Pakistan.

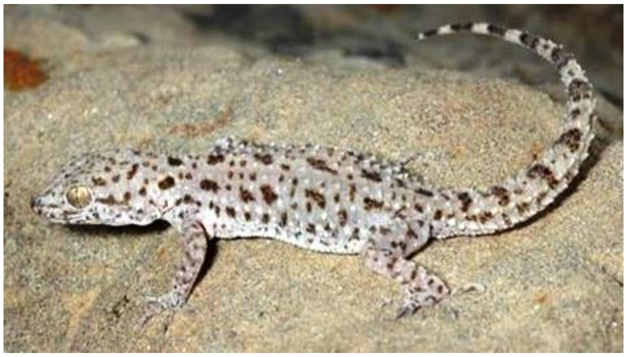


**Fig.5.10.** *Cyrtopodion kachhense kachhense* (Stoliczka)

### *11. Cyrtopodion kachhense ingoldbyi* Khan
(**Fig.5.11**)

Dorsum with trihedral tubercles, the sides of which are bowed in so that the tubercle has a sharp median longitudinal keel.
Interparietal scales 14-16.

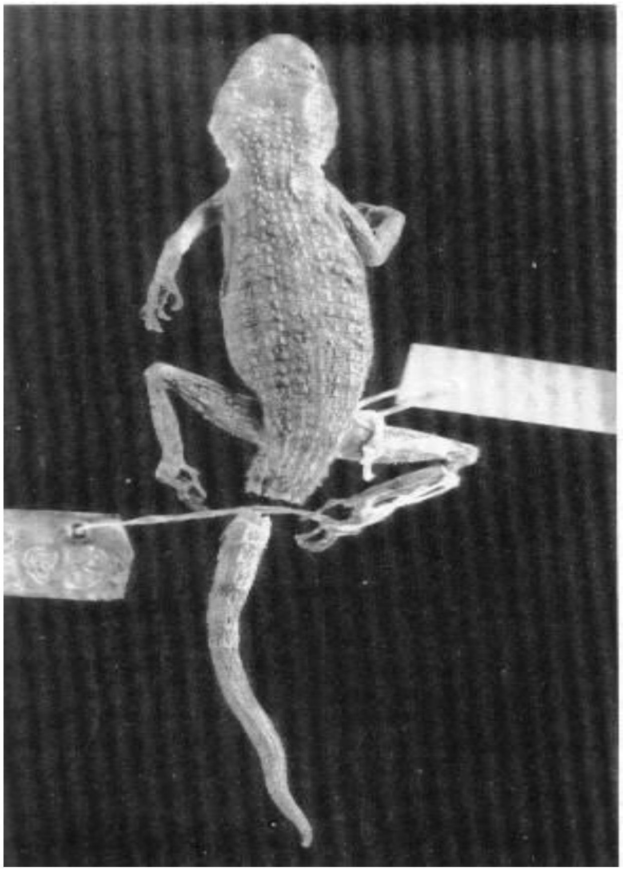


**Fig.5.11.** *Cyrtopodion kachhense ingoldbyi* Khan

Scales across midbelly 32-40.
Lateral cloacal tubercles 2-3.
Dorsolateral caudal keeled tubercles in 4 rows.
Snout-vent length 37-53 mm, tail 47-65 mm.

*Colour:*
Dorsum light gray with yellowish gray ventrum, with irregular dark brown bars, tail and limbs barred.

*Habitat*:
Khar-Rakhni-Quetta road to Punjab-Balochistan border meanders through a series of low hills. It colonizes holes and crevices among the bricks and stones under road bridges, with meager grass growing between boulders along sides of dry beds of torrents.

*Range:*
Mountain form, widely distributed in the hills along Khar-Rakhni-Quetta road, about 10 km west of Fort Munro.

### *12. Cyrtopodion kohsulaimanai* (Khan)
(**Fig.5.12**)

Interorbitals 14-17.
Dorsum with large trihedral tubercles arranged in longitudinal rows, not in contact with each other.
Rows of scales across midabdomen 27-30.
Scales along midventrum of the body from postmentals to the anterior lip of the vent 120-138.
A continuous series of 30-40 preanofemoral pores.
Snout-vent length 54-59 mm, tail 70-73 mm.

*Colour:*
Dorsum light gray, with fine light brown granulations; head and supralabials mottled with brown. Brown and white tubercles alternate with each other. Juveniles with 6-7 indistinct transverse bands from neck to the vent. Limbs and tail barred.

*Habitat*:

Essentially a ground gecko, inhabiting barren sparsely vegetated areas, in semi-sandy desert situations where it inhabits holes and fissures in the ground. However, where artificial structures in the form of buildings and bridges are available, the gecko readily invades them, inhabiting crevices and holes among bricks and stones.

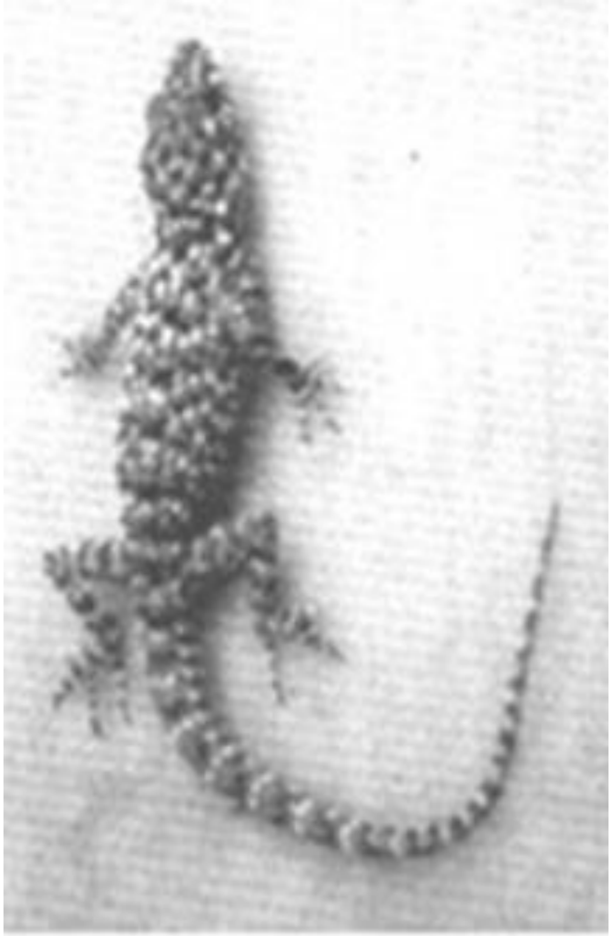


**Fig.5.12.** *Cyrtopodion kohsulaimanai* (Khan)

*Range:*

Known from two localities, Sakhisarwar and Rakhni Gorge, along Dera Ghazi Khan-Fort Munro road, in District Dera Ghazi Khan, northwestern Punjab, Pakistan.

### ***13. Cyrtopodion montiumsalsorum***

(Annandale)

(**Fig.5.13**)

Dorsal large trihedral tubercles are arranged in regular longitudinal rows. They are mostly in contact with each other.

Scales across midabdomen 21-23.

Interorbitals 11-13.

Scales along midventrum of body from postmentals to the anterior of vent 112-115.

A series of 26-32 preanofemoral pores.

Snout-vent length 43-46 mm, tail 58-60 mm.

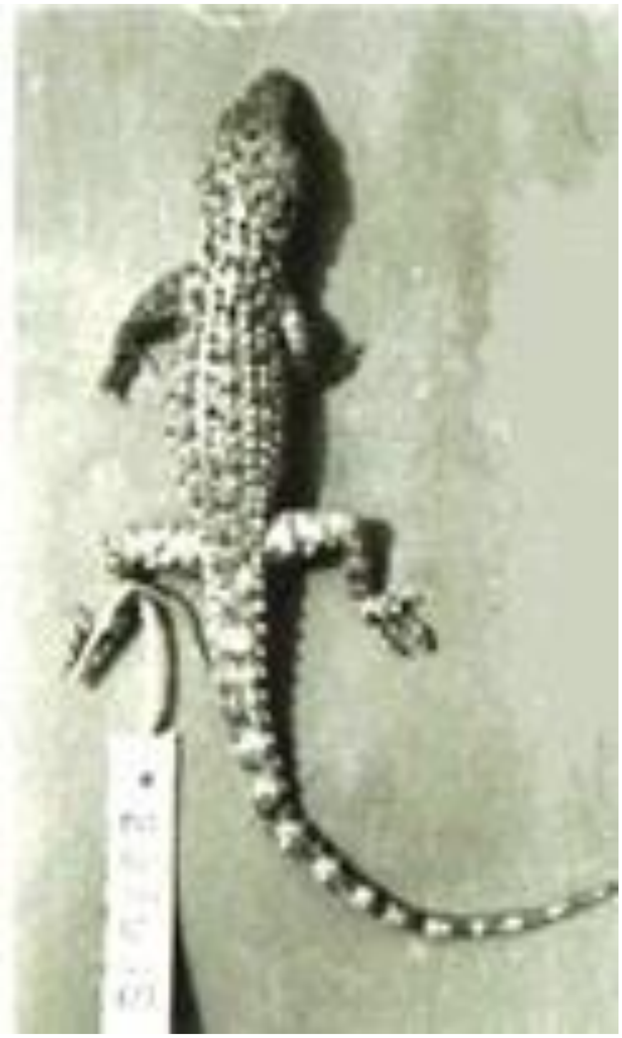


**Fig.5.13.** *Cyrtopodion montiumsalsorum* (Annandale)

*Colour:*

Dorsum light gray, dark brown and light tubercles are transversally disposed in alternate rows, giving the dorsum a variegated pattern. Tail with 13-14 crossbars. Head and labials mottled with dark brown to black. Belly light.

*Habitat*:

Primarily inhabits holes and crevices in badlands terrain along the southern Salt Range. It secondarily invades holes and crevices in the walls of buildings and rocks. It occurs sympatrically with *Cyrtopodion scabrum* and *Cyrtopodion watsoni*. In Rohtas Fort, it is sympatric with *Indogekko rohtasfortai*.

*Range:*

Collected from various localities in the southern Salt Range, Punjab, Pakistan.

### ***14. Cyrtopodion potoharensis*** Khan

(**Fig.5.14**)

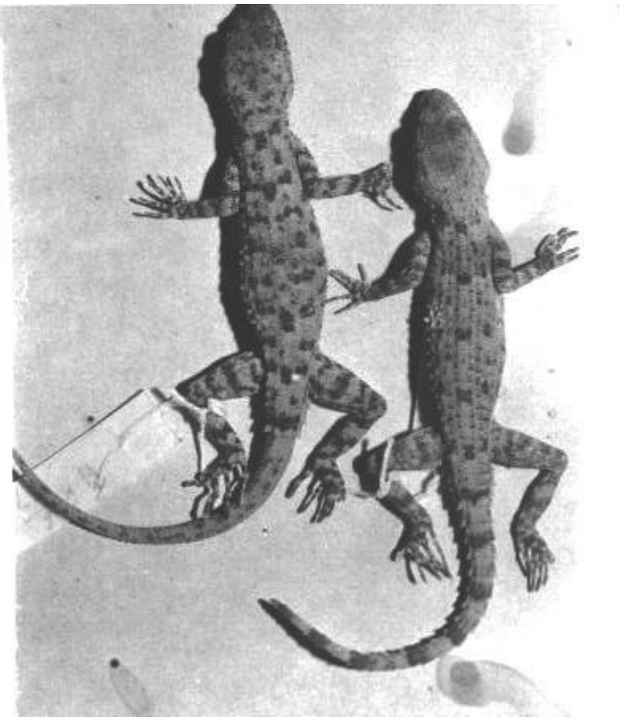


**Fig.5.14.** *Cyrtopodion potoharensis* Khan

Supralabials 10-15.

Interorbital scales 12-17.

Abdominals squarish, 25-33 across midabdomen.

Midventrals 121-145, from the postmentals to the preanal lip.

Postfemoral tubercles 5-12.

Preanal pores 6-7, arranged in an angular arch, in distinctly enlarged scales.

Caudal tubercles distinctly mucronate.

Snout-vent length 37-52 mm, tail 47-64 mm.

*Colour:*

Dorsum light bluish with 3-4 heterogeneous squarish dark spots arranged in 5-8 transverse series, from nape to the level of vent, tail with 10-12 dark bands. Limbs and digits heavily barred with black.

*Habitat*:

Collected during day from holes and crevices under roads and rail bridges, and under from under stones and slabs in District Attock, northern Punjab. Some were collected from holes and crevices along sides of mudflats through which roads run.

*Range:*

Was collected from different localities in central Potwar Plateau, Salt Range, Punjab.

### ***15. Cyrtopodion scabrum*** (Heyden)

(**Fig.5.15**)

Subcaudals in a single series of broad scales.

Scales across midabdomen not more than 25.

Snout-vent length 43-44 mm, tail 43-45 mm.

*Colour:*

Light gray to light brown dorsum, with regular brown spots, tail barred with dark brown.

*Habitat*:

A common ground gecko, it inhabits dry scrublands, and dry stony hillsides with typical sparse xerophytic vegetation. Crevices, holes, and fissures in soil with sparse grass are inhabited by this gecko. Near human habitations, it lives in crevices in boundary walls of inhabited houses, occasionally venturing inside the buildings attracted by the photophilic insects: however, it avoids confrontation with common house geckos *Hemidactylus flaviviridis* and *H. brookii*.

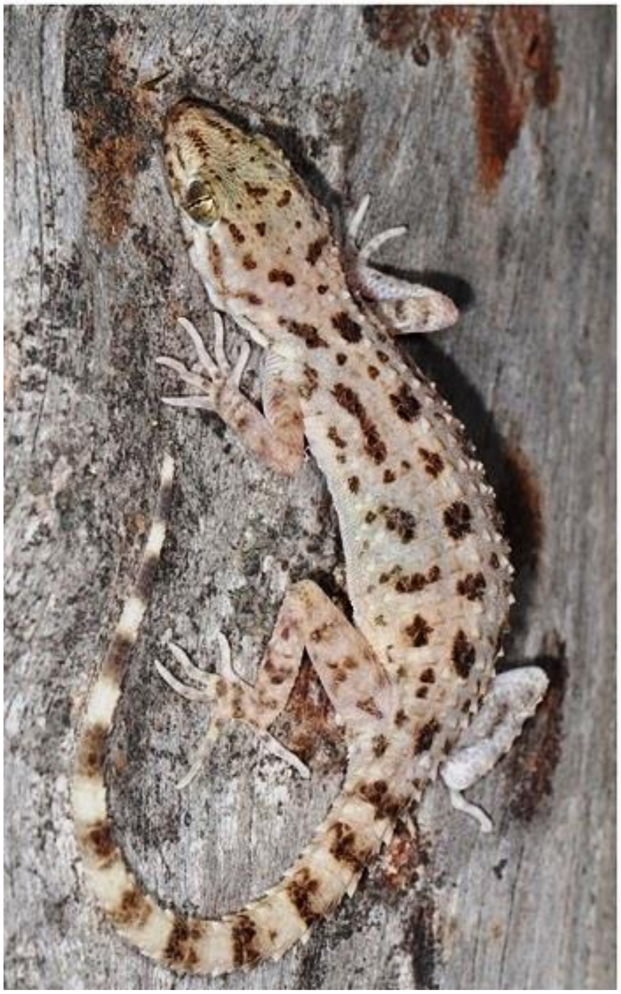


**Fig.5.15.** *Cyrtopodion scabrum* (Heyden)

*Range:*
From Egypt to Rajputana, India. In Pakistan, it has been reported from the upper and lower Indus Valleys, and along the eastern edge of the Thar Desert. It is widely distributed in Balochistan and Waziristan.

### ***16. Cyrtopodion watsoni*** **(**Murray)
(**Fig.5.16**)

More than 25 scales across midabdomen.
Dorsal granular scales intermixed with larger flat keeled scales and large trihedral tubercles.
Snout-vent length 50-53 mm, tail 54-57 mm.

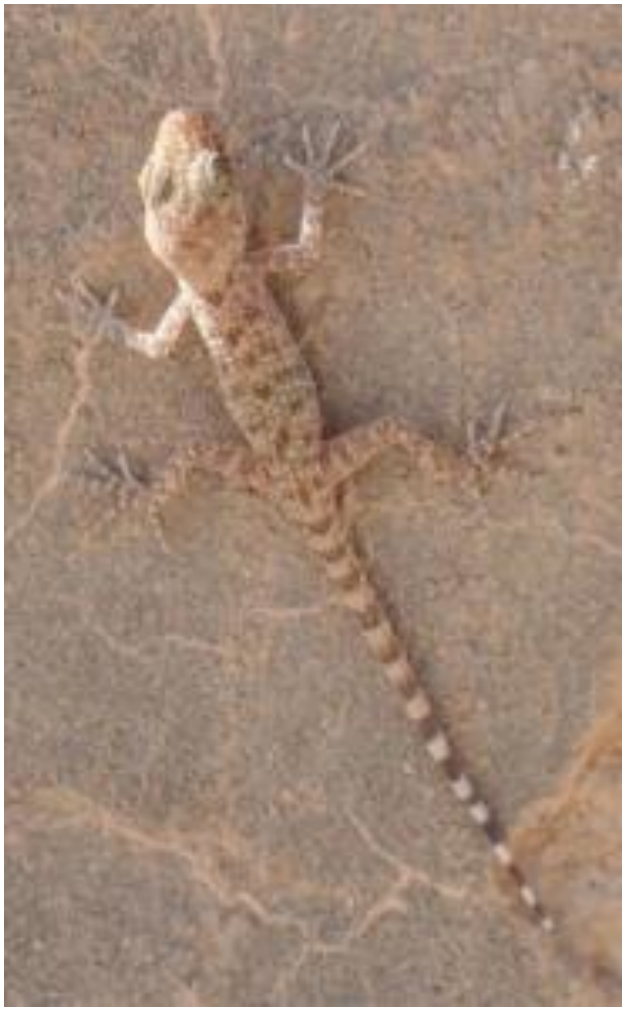


**Fig.5.16.** *Cyrtopodion watsoni* **(**Murray)

*Colour:*
Light brown dorsum, with scattered dark spots. Tail barred with dark.

*Habitat*:
Mountain gecko lives in holes and crevices in the

ground, and stone or brick walls. Occurs sympatrically with *C. scabrum*; however, avoids competition with other sympatric geckos, *Hemidactylus flaviviridis* and *H. brookii*.

*Range:*
Reported from western Salt Range, Punjab, and Quetta, Balochistan, Pakistan.

### ***17. Hemidactylus brookii*** Gray
(**Fig.5.17**)

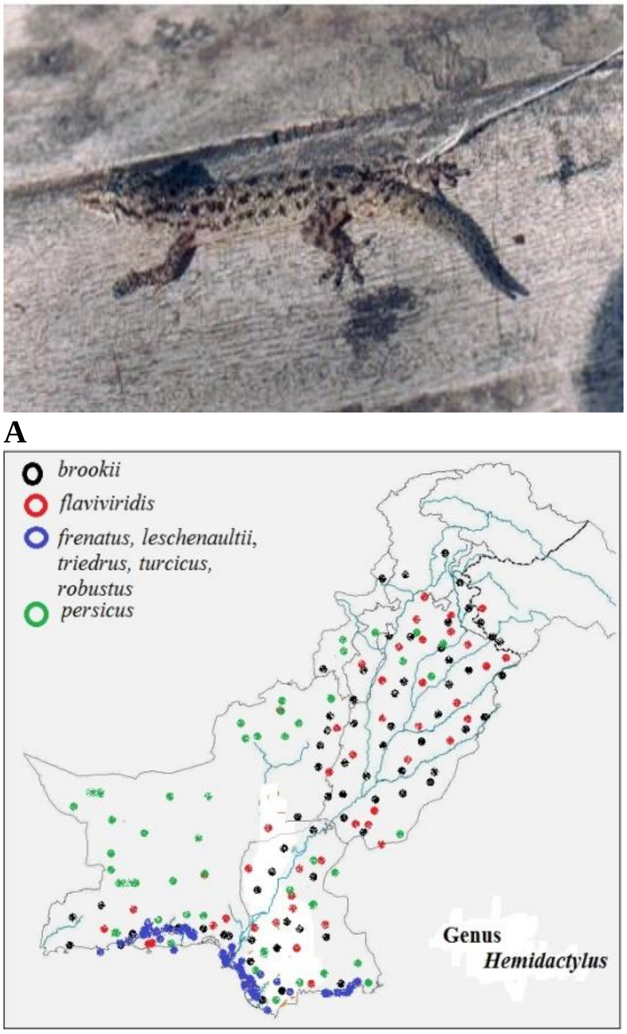


**Fig.5.17.** *Hemidactylus brookii* Gray. B shows distribution of various species of Genus *Hemidactylus* in different regions of Pakistan.

The ear opening is oval, about 1/3rd the size of the eye.
Dorsum granular, interspersed with small subtrihedral tubercles.
Supralabials 8-10, infralabials 7-9.
Lamellae under 4th toe 8-10.
Tail cylindrical, distinctly segmented, with 3 dorsolateral rows of small flat caudal tubercles, a single row of broad subcaudals.
Male with preanal and femoral pores, separated medially by 2-3 scales.

*Colour:*
Dorsum shows metachromatic changes, from dark brown to light gray, spotted with dark, a dark stripe from eye to the temple.

*Habitat*:
Most common gecko in the countryside, avoids competition with common house geckos, *Hemidactylus flaviviridis*, which inhabits the interiors of buildings. It frequents piles of chopped vegetation, logs, crops, in crevices and holes in the ground, under tree bark, around potted plants, dark uninhabited huts, leaf litter, and piles of trash. It is known to frequent tilled areas, forests, oases where it is found under leaf litter, fallen trees, and anything which can provide shelter.

*Range:*
Wide ranging in Southeast Asia, from Borneo, China, through tropical and subtropical Asia, extending through India, Pakistan, and the Middle East to northern Africa. There are reports of it from the West Indies.
In Pakistan it is a common gecko in the plains, avoiding higher northern mountains, and extends into the peripheral humid areas around deserts and oases. In Rohtas Fort it occurs sympatrically with *Cyrtopodion montiumsalsorum*, *Indogekko rohtasfortai*, *Hemidactylus flaviviridis*, and *Hemidactylus persicus*. It is widely distributed in alpine Punjab and Azad Kashmir.

### *18. Hemidactylus flaviviridis* Ruppell

(**Figs.5.18 & 5.17B**)

Dorsum with granular scales, no distinct tubercles.
Ssupralabials 12-15, infralabials 10-14.
Lamellae under first 7-10, under fourth toe 12-15.
Tail indistinctly segmented; caudal tubercles small and conical.
Preanofemoral pores 8-15.
Snout-vent length 86-95 mm, tail 89-93 mm.

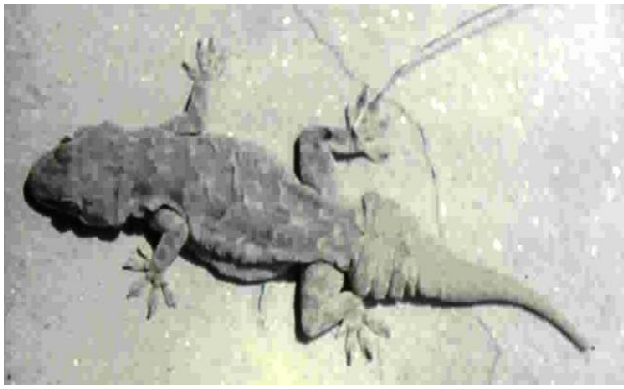


**Fig.5.18.** *Hemidactylus flaviviridis* Ruppell

*Colour:*
Dorsum shows marked metachromatic variations. Those geckos living outside the buildings, under tree bark, etc., are greenish gray, with 5 distinct dark wavy crossbars; tail is similarly barred. Dorsal pattern fades out in older geckos or in those living inside the buildings and rarely exposed to sunlight, usually they are almost uniformly grayish white; however, the ventrum is always light yellowish.

*Habitat*:
Most common and familiar house gecko throughout the plains of Punjab, Sindh, and sub-Himalayan areas. It is a strict commensal with man and strongly edificial species. It climbs into large trees, like *banyan*, *Acacia*, and *Dalbergia*, where it lives and lays its eggs in holes or under bark.

*Range:*
Wide ranging from the Red Sea to the coasts of Arabia and Iran, Pakistan, and India to Bangladesh. Human agency has played an important role in its wide Range. In Pakistan it is reported from throughout the plains below 1000 m, always in association with man.

### *19. Hemidactylus frenatus* Schlegel

(**Figs.5.19 & 5.17B**)

First toe less than half the length of second.
Dorsal tubercles few or absent.
Supralabials 10-12, infralabials 8-10.

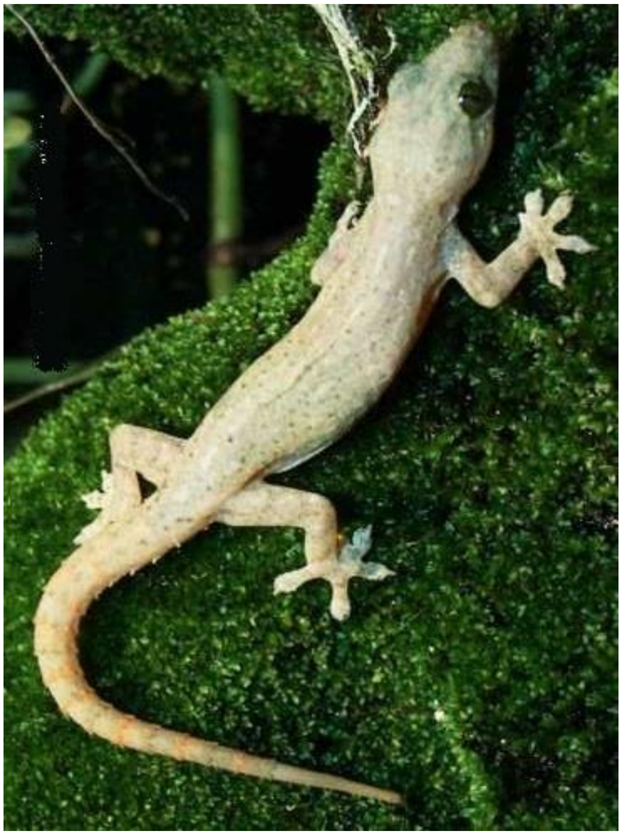


**Fig.5.19.** *Hemidactylus frenatus* Schlegel

Subdigital lamellae under first 4-5, and 9-10 under fourth toe.
Tail feebly depressed, with a series of enlarged subcaudals.

Male with a continuous series of 26-36 preanofemoral pores.
Snout-vent length 60-62 mm, tail 60-67 mm.

*Colour:*
Dorsum grayish or pinkish, sometimes much darker. With indistinct dark spots, sometimes arranged in stripes. Ventrum white, tail sometimes red.

*Habitat*:
A coastal species which, does not venture deep into the plains. Its natural habitat coincides with that of *Hemidactylus brookii.* It inhabits parks and gardens where coconut and date palm trees are common. They have been collected from among palm fronds or beneath rubbish. It rarely ventures into buildings, apparently avoiding to competition with the common yellow-belly house gecko and *Hemidactylus turcicus*.

*Range:*
A pantropic species, in Pakistan it has been collected from the lower Indus Delta.

### *20. Hemidactylus leschenaultii* Duméril and Bibron

(**Figs.5.20 & 5.17B**)

*Bibron:*
Round feebly keeled tubercles are scattered among granular dorsal scales which are much smaller than the interspaces, few on anterior, numerous on posterior half of the body.
Supralabials 10-12, infralabials 8-10.
Lamellae under first 6-7, and under fourth toe 9-11.
Tail strongly depressed, segmented, with a median series of enlarged subcaudals; 6 rows of dorsal pointed subcaudal tubercles.
Male with 10-17 femoral pores, medially separated by several scales.
Snout-vent length 85-86 mm; tail 85-87 mm.

*Colour:*
Dorsum gray, with dark brown crossbars or rhomboidal blotches. A dark streak from eye extends onto flanks. Dirty white belly.

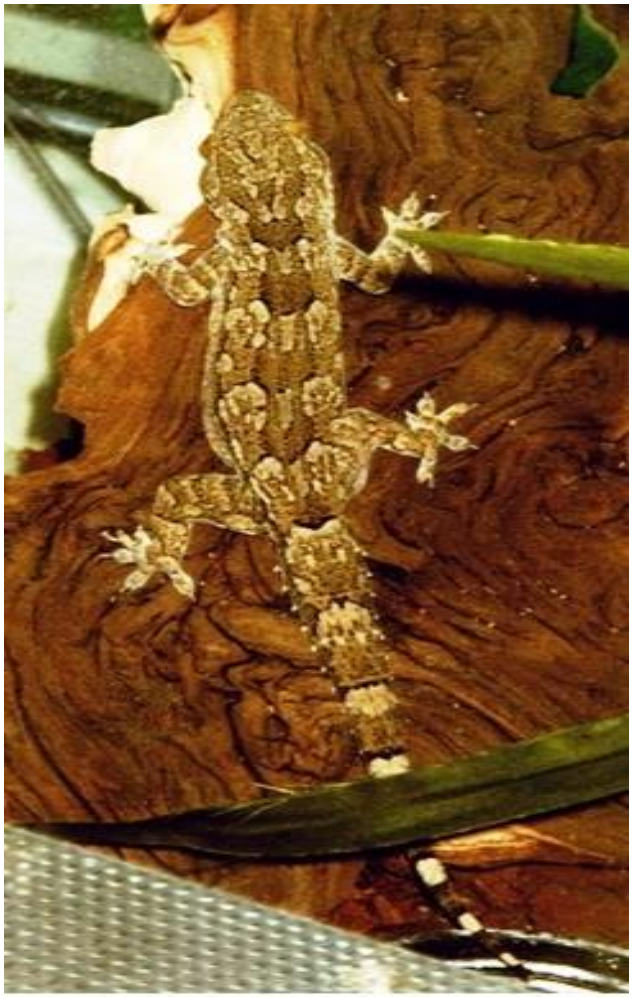


**Fig.5.20.** *Hemidactylus leschenaultii* Duméril

*Habitat*:
Arboreal, preferring large mango and banyan trees, and rarely venturing inside buildings. It is a common house gecko in Bengal. Lives under loose tree bark or between base of branches.

*Range:*
From Assam, Bangladesh, eastern and southern India, along the western coast, reaching the lower Sindh in Pakistan, where it is recorded from various localities in the lower Indus Delta and Las Bela in southern Balochistan.

### *21. Hemidactylus persicus* J. Anderson
(**Figs.5.21 & 5.17B**)

1. Supralabials 10-12, infralabials 8-10.
2. Lamellae under first 8-10, under fourth toe 12-14.
3. Preanal pores 9-13.
   Snout-vent length 68-70 mm, tail 84-86 mm.

*Colour:*
Dorsum light brownish gray, with irregularly scattered white, brown, or black keeled tubercles. Irregular light dark spots, a dark line on the side of the head, ventrum whitish.

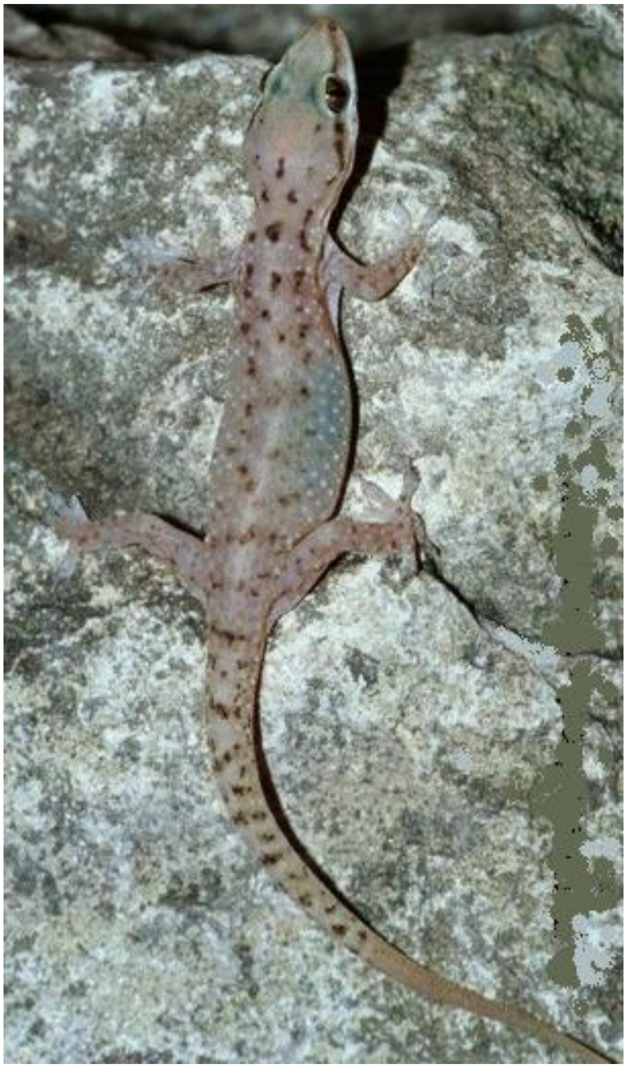


**Fig.5.21.** *Hemidactylus persicus* J. Anderson

*Habitat*:
Inhabits trees and buildings in rocky deserts and xerophytic stony terrain, on trees in oases. Invades buildings, especially old tombs.

*Range:*
From eastern Arabia, through southern Iran, Balochistan to Sindh, northward to Waziristan. Recently it has been reported from the southern Potwar Plateau, in central Punjab, Pakistan.

### *22. Hemidactylus robustus* Heyden
(**Figs.5.22 & 5.17B**)

1. Supralabials 8-11, infralabials 7-9
2. Lamellae under fourth toe 8-11
3. Preanal pores 6-7
4. Snout-vent length 68-70 mm, tail 84-86 mm.

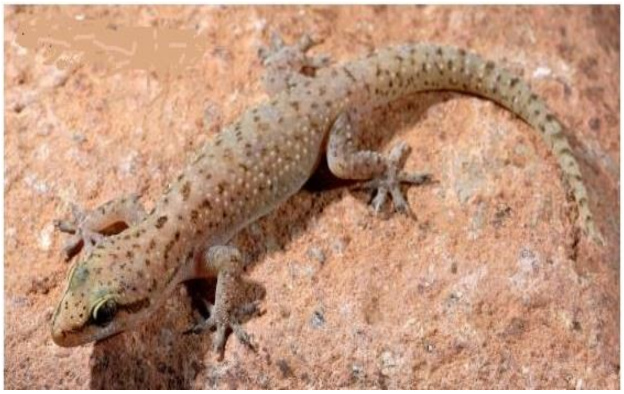


**Fig.5.22.** *Hemidactylus robustus* Heyden

*Colour:*
Basic dorsal coloration pinkish brown, translucent. A series *of dark sp*ots arranged longitudinally along mid-dorsum, often indistinct. Tail with numerous irregular, narrow, dark bands.

*Range:*
India, Pakistan, Egypt, Arabia, Abyssinia.

### *23. Hemidactylus triedrus* (Daudin)
(**Figs.5.23 & 5.17B**)

1. Dorsal large trihedral tubercles are arranged in 13-16 longitudinal rows. The

tubercles are larger than the interspaces between them.
2. Supralabials 8-10, infralabials 7-8.
3. Subdigital lamellae slightly oblique, 6-7 under first, and 7-10 under fourth toe.
4. Tail slightly depressed, with a series of transversally enlarged subcaudal scales.
5. Preanofemoral pores 6-14, in male, interrupted medially by 1-3 scales.
6. Naris separated from first supralabial. Snout-vent length 75-77 mm, tail 76-78 mm.

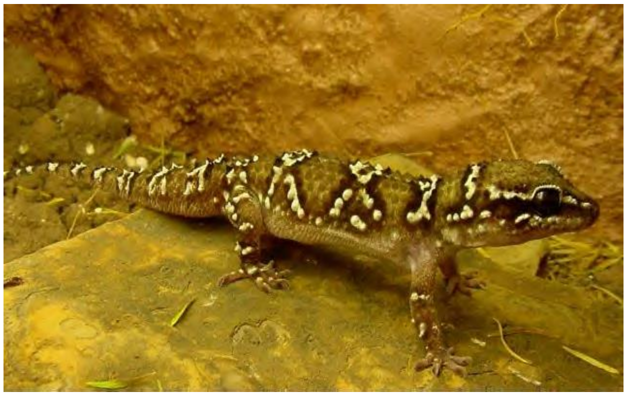


**Fig.5.23.** *Hemidactylus triedrus* **(**Daudin)

*Colour:*
Dorsum yellowish, with 3 large dark brown saddles which are narrowly edged with black; tail with dark rings. One or two yellow stripes behind eye, another on nape. Ventrum pale.

*Habitat*:
Collected from flat semiarid habitat with scrubby vegetation along coast region in Pakistan.

*Range:*
From Sri Lanka and peninsular India to Karachi, in Pakistan, where it is known from the coastal localities in the lower Indus Delta.

### 24. *Hemidactylus turcicus* (Linnaeus)
(**Figs.5.24 & 5.17B**)

1. Naris bordered by first supralabial.
2. Supralabials 7-10 and infralabials 6-9.
3. Dorsal tubercles large, subtrihedral arranged in 14-16 fairly regular longitudinal rows.
4. Subdigital lamellae under inner 7-8 and under fourth toe 8-11.
5. Tail subcylindrical, covered above with irregular, somewhat pointed scales and a series of 6-8 large pointed tubercles, median subcaudals are transversally enlarged.
6. Male has 4-10 (rarely 2) preanal pores. Snout-vent length 58-61 mm, tail 59-65 mm.

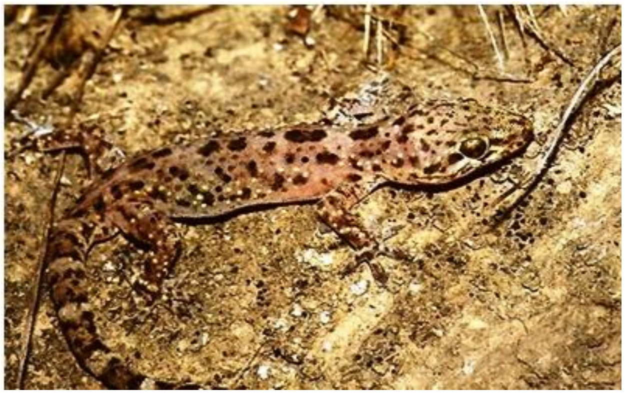


**Fig.5.24.** *Hemidactylus turcicus* (Linnaeus)

*Colour:*
Dorsum light brown or grayish, spotted with black, sometimes spots arranged in transverse series. A dark streak on sides of the head usually present. Ventrum dirty white.

*Habitat*:
A coastal gecko, picked especially from the base of palm fronds, from under rocks, piles of stones, and bricks and rubbish.

*Range:*
Extensive range from the West Indies, eastern Mexico, southern United States, northern Africa, circum-Mediterranean countries and islands, the Middle East, Iran, and Afghanistan. In Pakistan it has been reported from various localities along coastal Sindh. In Karachi city this gecko has been found to occur in houses side by side with *H. flaviviridis*.

### *25. Indogekko fortmunroi* (Khan)

(**Fig.5.25**)

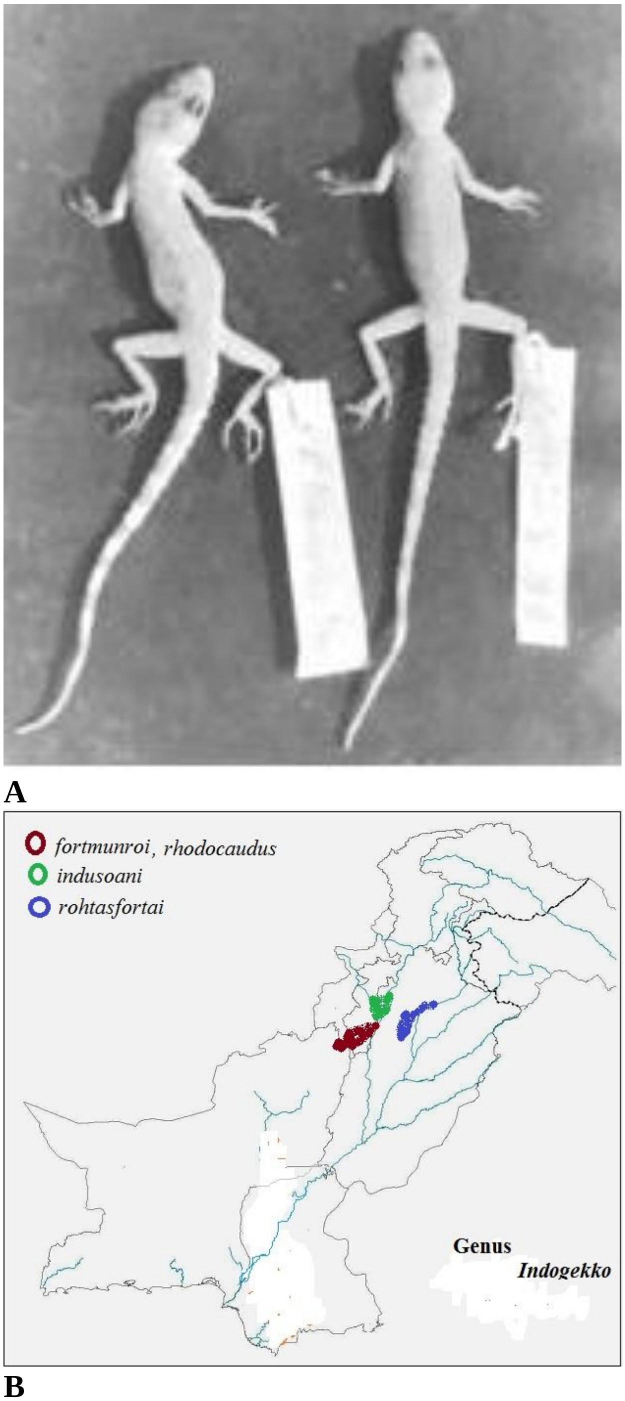


**Fig.5.25.** *Indogekko fortmunroi* (Khan). B shows distribution of various species of Genus *Indogekko* in different regions of Pakistan.

1. Dorsal granular scales tubercular, juxtaposed, interspersed with 12 rows of flat, keelless, round larger tubercles.
2. Body much depressed, habitus weak.
3. Tail longer than body, segmented, with 3 rows of trihedral caudal tubercles on sides.
4. Subcaudals in a transversally enlarged median series.
   Snout-vent length 48-50 mm, tail 65-68 mm.

*Colour:*

Dorsum light brown, with a series of 14 median transverse dark bands, as broad as the interspaces. Head light brown with dark mottling. A dark stripe from snout through eye joins first band on nape. Dorsal tubercles of light and dark form a mosaic dorsal pattern. Limbs mottled with dark. The geckos found in buildings are light gray with darker spots, and no dark mottling on head and limbs.

*Habitat*:

Inhabits crevices and holes among sandstone slabs, around Fort Munro. It readily invades buildings where it gathers around lights at night, to feed on photophilic insects.

*Taxonomic notes:*

Baig's (1998) taxon *Indogekko (Tenuidactylus) rhodocaudus*, from Tanishpa village, District Kila Saifullah, Balochistan. Is a sub species of *Indogekko rohtasfortai*, diffes in minor pholidosic variations and red tail tip (lost on preservation):

Pholidosic counts are:

1. Dorsum with 12-14 longitudinal rows of smooth or feebly keeled, enlarged tubercles.
2. Midabdominal scales 16-18.
3. Preanofemoral pores 23 in male; 5-9 preanal pores in female.
4 Dorsolateral rows of enlarged spinose scales on tail 2.

5. Midventral scales between mental and vent 92-106
   Snout-vent length 59.0 mm, tail length 74.0 mm.

*Range:*
Fort Munro and Khar village, in the northwestern Dera Ghazi Khan District, Punjab, Pakistan. Extended to northern Balochistan.

### ***26. Indogekko indusoani*** (Khan)
(**Figs.5.26 & 5.25B**)

1. Interorbitals 13-15.
2. Body depressed, tail longer than body.
3. Dorsal tubercles flat, in 11 irregular longitudinal rows.
4. Scale rows across midabdomen 23-25.
5. Preanal pores 4-5.
   Snout-vent length 50-53 mm, tail 75-78 mm.

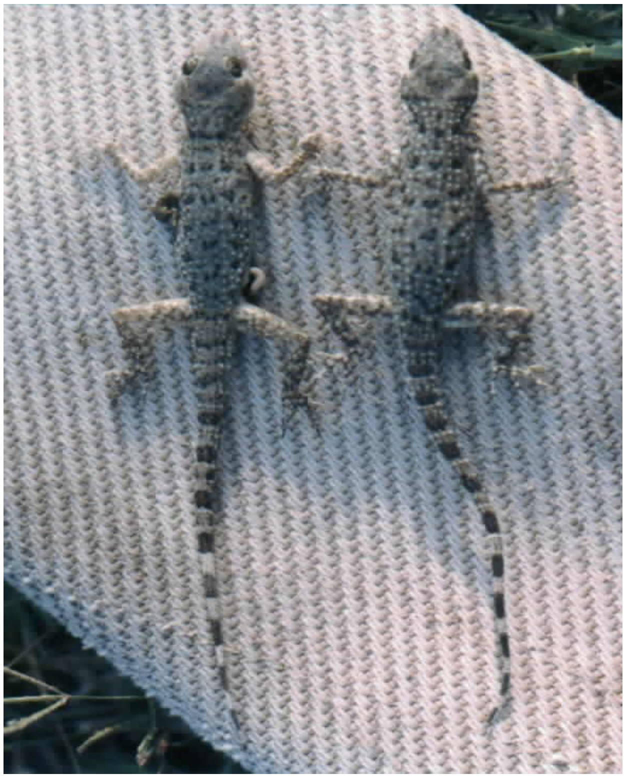


**Fig.5.26.** *Indogekko indusoani* (Khan)

*Colour:*
Dorsum light to dark gray, with dark mottling on snout and labials. A dark streak behind eyes connected behind nape with that of other side. Seven transverse dark bands from neck to the level of vent, each composed of a series of 3 oval spots. Limbs mottled with dark. Ventrum white.

*Habitat*:
Inhabits crevices among sandstone rocks along the bank of the River Indus, close to the site where Soan River opens in the Indus as it enters Punjab Province in District Mianwali. *I. rhodocaudus* is reported from similar habitat in northern Balochistan.

*Range:*
From northern Balochistan to the northwestern border of the Salt Range, Punjab, Pakistan.

### ***27. Indogekko rohtasfortai*** **(**Khan and Tasnim)
(**Figs.5.27 & 5.25B**)

1. Middorsum with flat, round, slightly keeled tubercles; lateral sides with subtrihedral to conical tubercles, in 12-14 longitudinal rows.
2. Scale rows across midabdomen 24-33.
3. Males with a continuous series of 18-27 preanofemoral pores.
4. Midventral scales 103-135, from postmentals to the anterior lip of vent.
   Snout-vent length 48-51 mm, tail 63-65 mm.

*Range:*
Widely distributed species in alpine Punjab and southeastern Azad Kashmir. It extends into the hilly terrain of the Potwar Plateau, especially from Jhelum to Islamabad west ward into northern Balochistan.

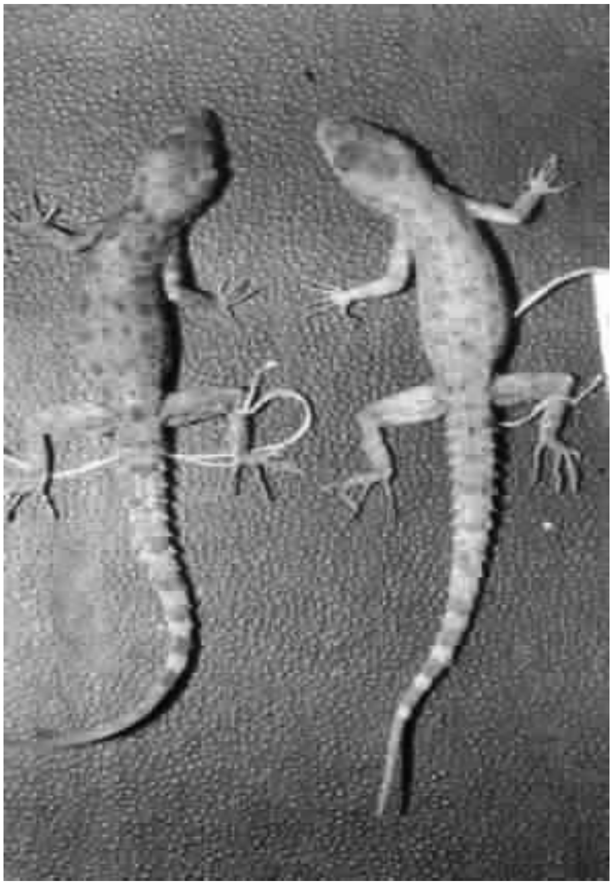
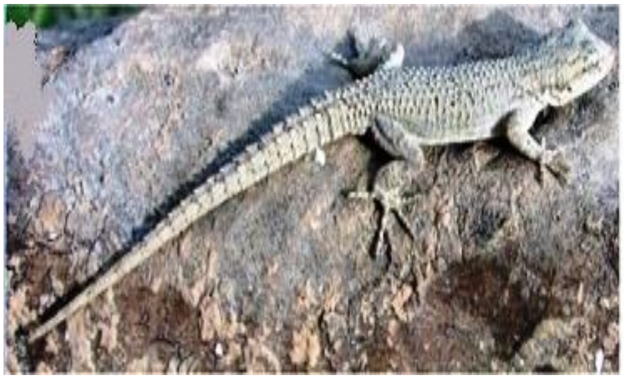


**Fig.5.27.** *Indogekko rohtasfortai* **(**Khan and Tasnim)

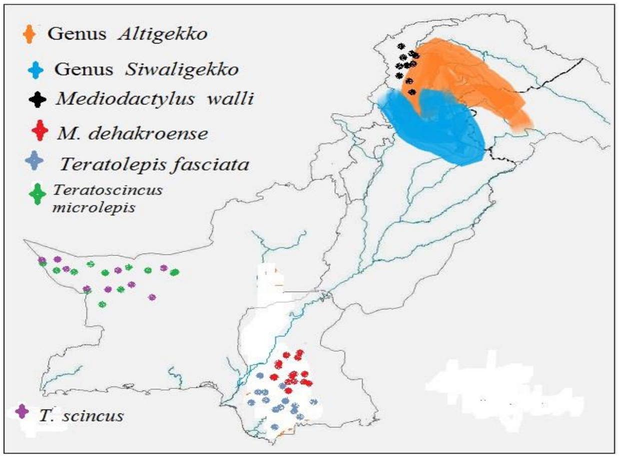
### *28. Mediodactylus dhakrensis* (Mansoor)
(**Fig.5.28**)

*Habitat*:
An arboreal species**.**

*Range:*
Known from Sindh



**A**



**B**

**Fig.5.28.** *Mediodactylus dhakrensis* (Mansoor). B shows distribution of species of Genus *Mediodactylus* in different parts of Pakistan.

### *29. Mediodactylus walli* (Ingoldby)
(**Figs.5.29 & 5.28B**)

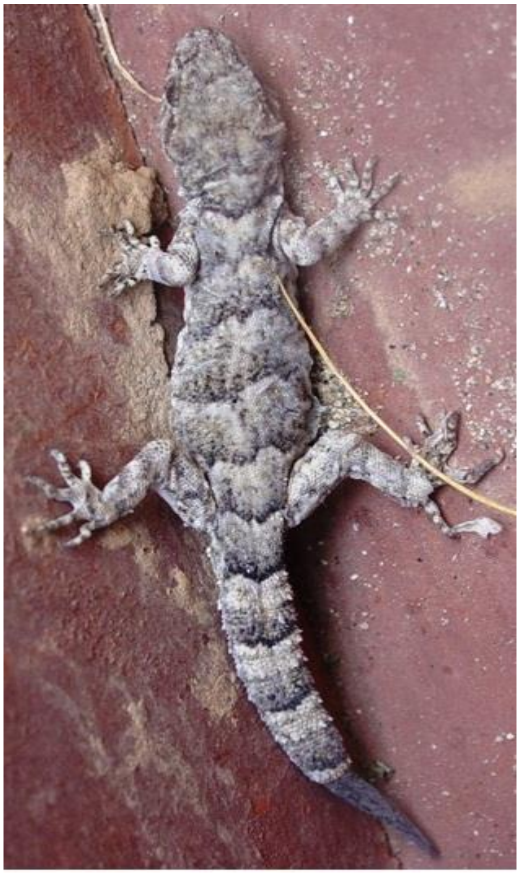


**Fig.5.29.** *Mediodactylus walli* (Ingoldby)

1. Body moderately depressed.
2. Dorsal tubercles are oval, keel-less scattered among granular scales.
3. Subcaudals are broader than long, in a single median series.
4. Caudal tubercles are given out from the middle of the caudal segments.
5. Preanal pores 4-5 in male.
   Snout-vent length 54-55 mm, 78-79 mm.

*Colour:*
Dorsum light gray to dark, with 9 wavy crossbars, slightly broader than the interspaces. A dark stripe from eye, joining the band on nape. Limbs barred, tail with alternating light and dark bars.

*Habitat*:
The gecko has been picked from the walls of inhabited houses.

*Range:*
Known from Drosh Fort, Karakal village in Bumhoet Valley, and Ghariet village, Chitral, and northwest Potohar, all in Khyber Pakhtunkhwa, Pakistan.

### ***30. Ptyodactylus homolepis*** Blanford
(**Fig.5.30**)

1. Digits terminate into a subtriangular expansion, which is as broad as the diameter of eye; claws are centrally located.
2. Supralabials 13-15, infralabials 12-15.
3. Mental and submental scales indistinct.
4. Rostral does not border naris.
5. Head and body with granular scales, no tubercles.
6. Tail subcylindrical, with smaller dorsal and larger ventral scales.
   Snout-vent length 100-108 mm, tail 85-89 mm.

*Colour:*
Dorsum light brown to gray, with broad transverse lighter wavy bands. Ventrum white.

*Habitat*:
Primarily a mountain species in northeastern Kirthar Range.

*Range:*
There is no subsequent report of this gecko from Pakistan. It is yet known only from its type locality, in the Kirthar Range.

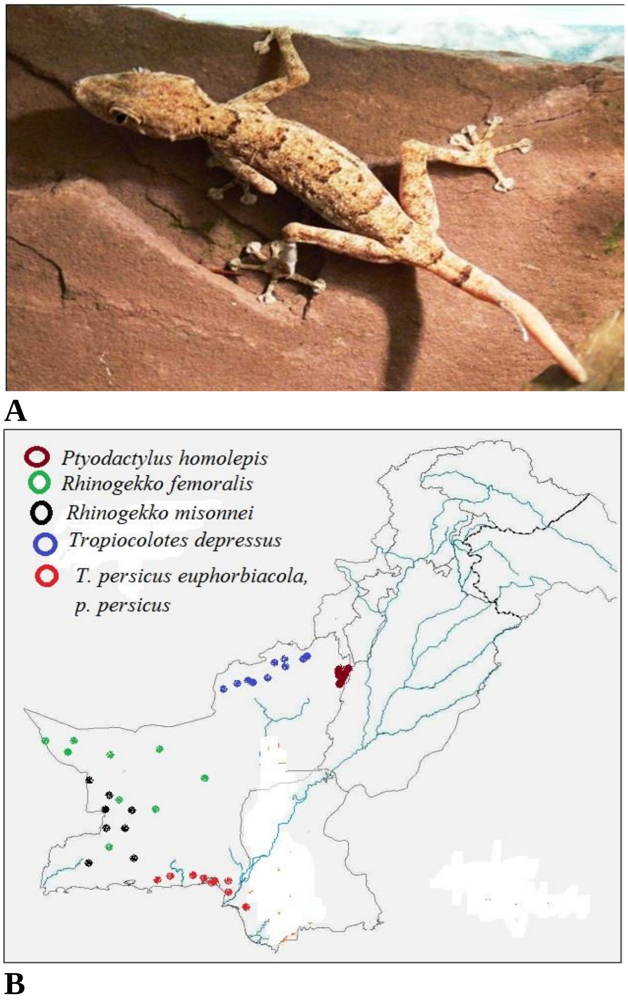


**Fig.5.30.** *Ptyodactylus homolepis* Blanford. B shows distribution of the species in different parts of Pakistan.

### *31. Rhinogekko femoralis* Smith
### (**Figs.5.31 & 5.30B**)

1. Head about twice as long as broad.
2. Diameter of ear opening is half that of the eye.
3. Mental longer than adjacent labials, a pair of distinct postmentals, which are in contact with each other.
4. Gulars small, flat granules.
5. Naris on a caruncle formed by rostral and first supralabial.
6. Ventrals in 17-21 rows at midbody.
7. Males with 6 (rarely 5) preanal pores.
8. A series of 9-12 enlarged subfemoral scales.
9. Tail longer than body, sharp-tipped.
   Snout-vent length 60-62 mm, tail 60-64 mm.

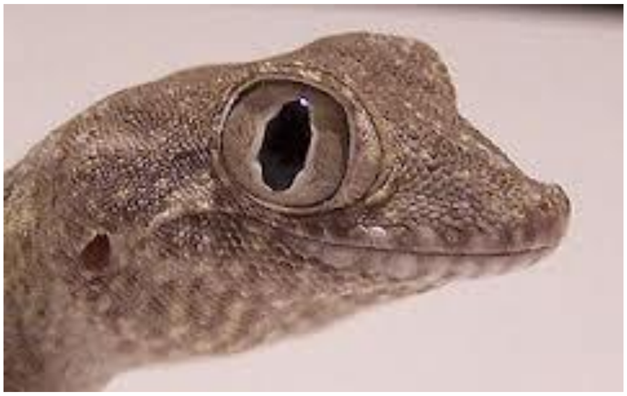


**Fig.5.31.** *Rhinogekko femoralis* Smith

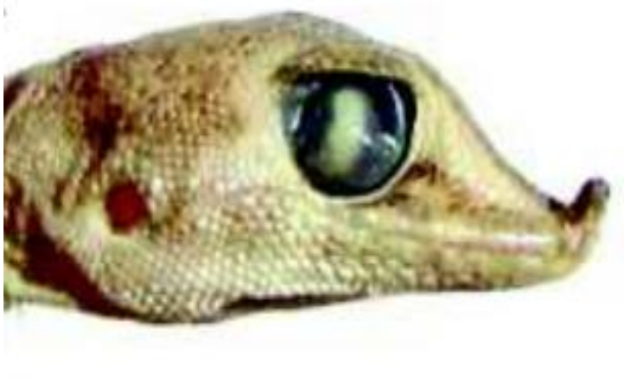
*Colour:*
Light yellow gray, with 5 dark cross bars on body and 8-10 on tail.

*Habitat*:
Gecko collected from sandy deserts with rocky outcrops and scarce vegetation of bushes. It is terrestrial and rarely climbs vertical surfaces. When encountered, it poises for defense by flattening its body, elevating its tail, and twitching it from side to side.

*Range:*
It has been reported from Kharan and Chagai Deserts, close to the rocky outcrops.

### *32. Rhinogekko misonnei* de Witte
### (**Figs.5.32 & 5.30B**)

1. Nasal scales strongly elevated carrying naris at a tube on the snout.
2. Scales across midbelly 26-28.
3. A row of 9-12 enlarged scales on thigh ventrum.
4. Four to eight very poorly developed preanal pores.
5. Tail slightly longer than the body.
   Snout-vent length 56-61 mm, tail length 58-73 mm.



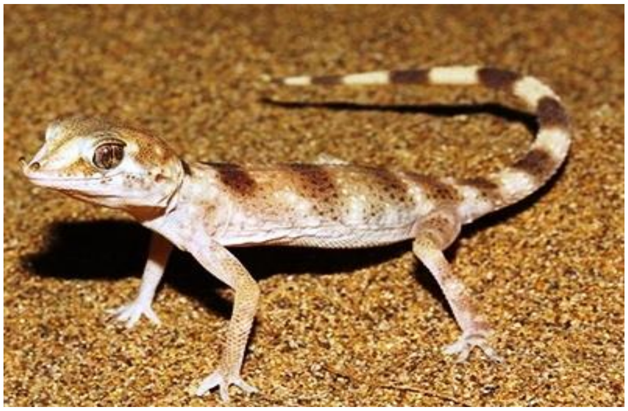


**Fig.5.32.** *Rhinogekko misonnei* de Witte

*Colour:*
Coffee gray dorsum, 5 wide dark transverse bands on body, 7 on tail, limbs similarly barred. Ventrum whitish.

*Habitat*:

The lizard is reported from the gravel deserts with scanty vegetation.

*Range:*

Known from Dasht-i-Lut along the Iran-Pakistan border.

### *33. Siwaligekko battalensis* (M. S. Khan)

(**Figs.5.33 & 5.28B**)

1. Dorsum with obtusely keeled flat tubercles scattered among granular scales.
2. Scales across midabdomen 50-52

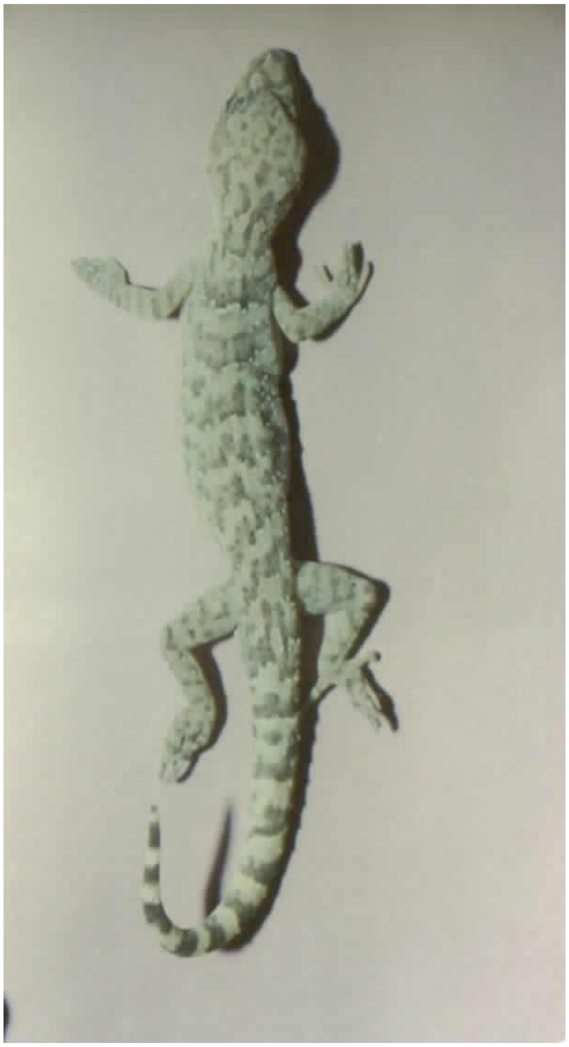


**Fig.5.33.** *Siwaligekko battalensis* (M. S. Khan)

3. Scales along midventrum of body from postmentals to anterior of the vent 199-205.
4. Preanal pores 9-10 arranged in an arch, no femoral pores.
5. Tail round, without marked segmentation.
6. Subcaudals small in several rows.
   Snout-vent length 60-64 mm, tail 63-64 mm.

*Colour:*

Dorsum light brown, with 7 dark brown transverse bands, much narrower than the interspaces, with irregular borders touching each other so to form a distinct dark reticulum on dorsum of the body. A vivid dark stripe from snout through loreal and eye joins first transverse band on the nape. Frontal with a dark U-shaped mark, several small transverse stripes on head. Limbs with dark reticulation. Tail with 11 dark rings, extending onto the tail ventrum.

*Habitat*:

An alpine gecko, living in crevices among rocks, close to the roots of vegetation. It invades buildings, living in holes and crevices among brick and stone walls. Its movements are deliberate, invades surrounding vegetation just after sunset, and returning to its retreats before dawn.

*Range:*

The reticulate gecko is known only from its type locality, Batgram, District Manshera, Khyber Pakhtunkhwa, Pakistan.

### *34. Siwaligekko dattanensis* (M. S. Khan)

(**Figs.5.34 & 5.28B**)

1. A single pair of postmentals.
2. Dorsal tubercles round, keel-less, arranged in longitudinal rows.
3. Male with 8-9 preanal pores.
4. Tail unsegmented, round, with small flattish caudal tubercles, small subcaudals.
   Snout-vent length 60-62 mm, tail 56-57 mm.

*Colour:*
Darkish gray dorsum, with 10 dark brown wavy crossbars from nape to the vent, broader than the interspaces; bars tend to break into spots on flanks. Tail barred, bars extending onto tail ventrum. Belly dirty white.

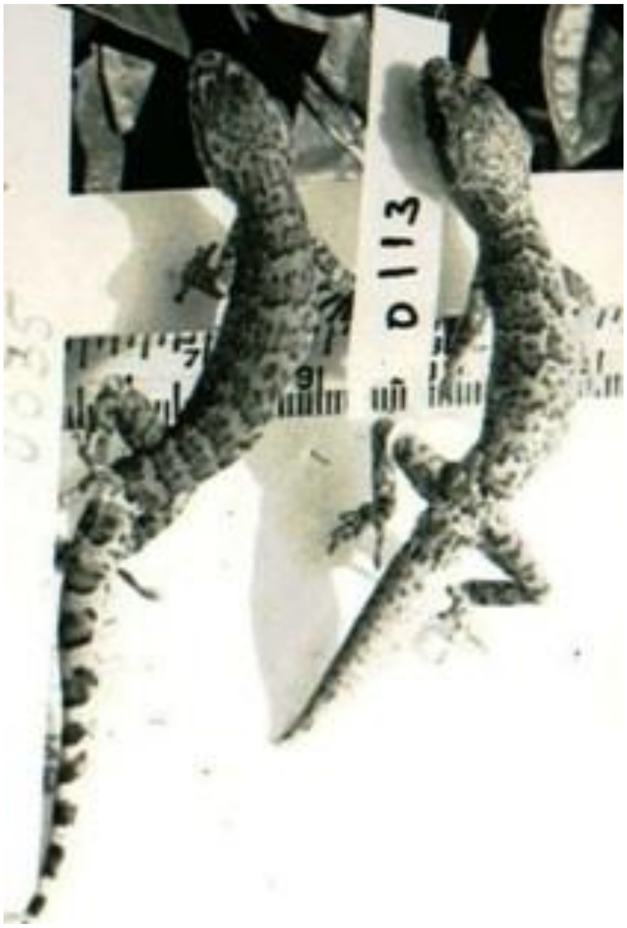


**Fig.5.34.** *Siwaligekko dattanensis* (M. S. Khan)

*Habitat*:
Collected from rocky alpine terrain, where it lives in crevices among rocks and among roots of pine trees. It feeds on soft bodied insects and their larvae.

*Range:*
The barred gecko is widely distributed in alpine Punjab and eastern Northwestern Frontier Province, Pakistan.

### ***35. Siwaligekko mintoni*** (Golubev and Szczerbak)
(**Figs.5.35 & 5.28B**)

1 Dorsal pattern of narrow wavy dark brown crossbars, much narrower than interspaces. Bands are broken into round spots on flanks.
2. Nasal scales 3.
Snout-vent length 38-40 mm, tail 35-37 mm.

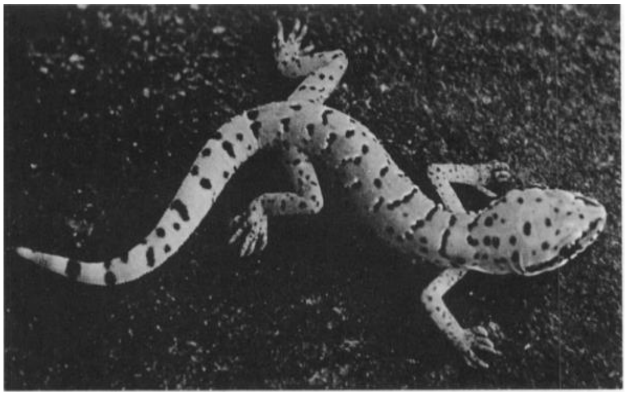


**Fig.5.35.** *Siwaligekko mintoni* (Golubev and Szczerbak)

*Colour:*
Dorsum amber, shading to lemon on tail. A series of 8 irregular, wavy, broken, dark brown to black crossbars on body, mostly with posterior white edge. Sides of body, head, tail, and limbs with scattered dark brown dots. Ventrum pale yellow. Labials barred.

*Habitat*:
Collected from stony areas in wooded hilly country at about 100 m of elevation. The gecko is sluggish with deliberate movements.

*Range:*
Known by its type specimen, which was collected from Udigram, Swat, Khyber Pakhtunkhwa, Pakistan.

### ***36. Teratolepis fasciata*** (Blyth)
(**Figs.5.36 & 5.28B**)

1 Digits are moderately dilated, with a terminal slender clawed phalanx arising

angularly from the middle of the terminal expanded part of the digit.
2. A series of transverse subdigital lamellae, anterior of which are slightly notched.
3. Body dorsum with large pointed imbricate scales, much larger than the ventrals.
4. Tail swollen, its posterior one-fourth tapers abruptly behind to a point, dorsally covered with large imbricate scales.
5. Subdigital lamellae 7 under first, 8-9 under fourth toe.
6. Male with 5-6 preanal pores.
   Snout-vent length 45-46 mm, tail 32-33 mm.

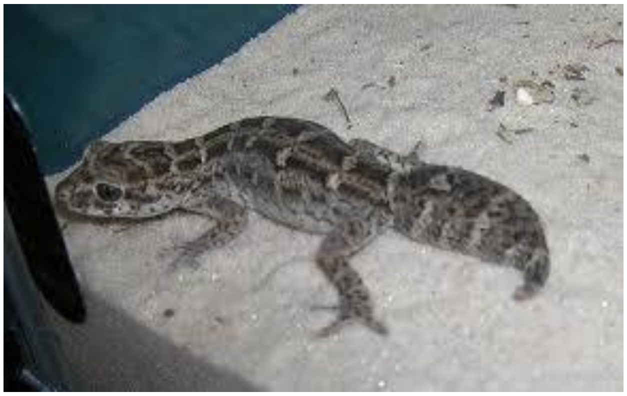


**Fig.5.36.** *Teratolepis fasciata* (Blyth)

*Colour:*
Light grayish brown dorsum, with 5 longitudinal dark brown stripes, crossed by 6 rows of large whitish spots. A pair of whitish transverse bands on the occiput. Tail brownish with whitish crossbars.

*Habitat*:
The most striking feature of this gecko is its large thick flat tail, covered with large leaf-like scales. The tail serves as storehouse for the surplus fat, and is used as a shield and as an assault organ.

The gecko inhabits flat terrain with an average elevation of 10 m above sea level. The soil is generally loose gray silt with desert scrub vegetation, dominant plants are *Salsola* and grasses.

*Range:*
The gecko is recorded from different localities in the lower Indus Delta in Pakistan.

### *37. Teratoscincus microlepis* Nikolsky
(**Figs.5.37 5.28B**)

1. Middorsal large cycloid scales do not extend beyond shoulder.
2. Scales round midbody 100.
3. Head with granular scales.
4. Postmentals absent.
5. Tail with a median dorsal series of large flat scales.
6. A prominent upper movable eyelid.
   Snout-vent length 71-73 mm, tail 47-51 mm.

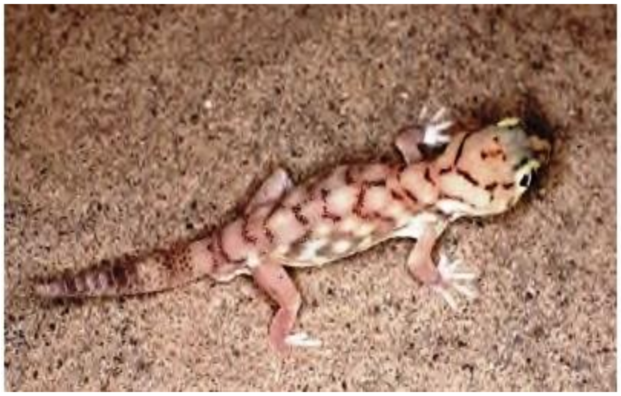


**Fig.5.37.** *Teratoscincus microlepis* Nikolsky

*Colour:*
Dorsum cream, with dark brown, oblique or V-shaped bars on back, indistinct in older specimen. A dark U-shaped mark on the back of head. Tail barred with dark.

*Habitat*:
Xerophytic shrubs in loose sandy soil. It movements are slow and deliberate, however, to escape capture it sprints and takes to shelter. Captured individuals lunge and strike with the tail, which is kept twitching sideways. The

geckos feed on soft-bodied arthropods and larvae of certain sand beetles. When moving on sand the tail leaves a streak between the tracks.

*Range:*

The gecko has been collected from Nushki and Kharan in Balochistan; it extends westward to Dasht-i-Lut, near Kirman, Iran.

### ***38. Teratoscincus scincus*** (Schlegel)

(**Fig.5.38**)

1. A median dorsal series of large cycloid scales extends to the back of head.
2. No postmental scales.
3. Scales round the midbody 28-34.
4. Head with granular scales.
5. Tail with a median dorsal series of large cycloid scales.
6. Upper eyelid moveable.
   Snout-vent length 116-120 mm, tail 89-92 mm.

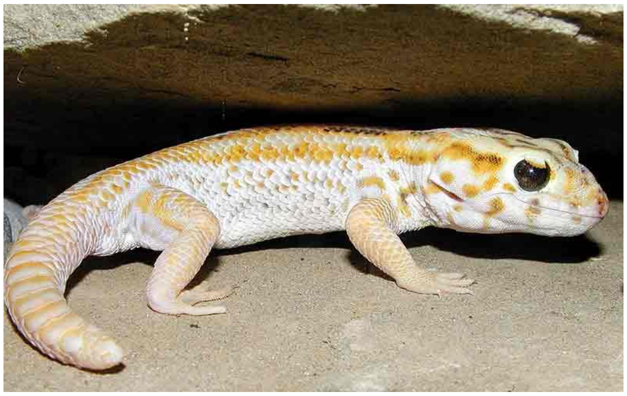


**Fig.5.38.** *Teratoscincus scincus* (Schlegel)

*Colour:*

Dorsum cream, with faint dark brown transverse bars or with 4 reddish brown longitudinal stripes. Head with brown markings, lips barred. Sides and ventrum pinkish to white.

*Habitat*:

Restricted to fine windblown tracts of sand, it is nocturnal, becoming active just after sunset. It walks deliberately with the legs holding the body high, tail trailing behind, and leaving distinct spoor. When followed it sprints for a short distance, stopping occasionally to observe the pursuer. When cornered it turns around to attack with a snarl, twitching and swaying its tail, the scales of which produce faint rustling sound. It often lashes the intruder with its tail. The gecko, if cornered, bites powerfully. Its burrows are 20-28 cm deep and the entrances are plugged by sand.

*Range:*

This gecko has a wide range in the west from the Caspian Sea to Tajikistan, and extends into western Balochistan, Pakistan.

### ***39. Tropiocolotes depressus***

Minton & J. A. Anderson

(**Figs.5.39 & 5.30B**)

1. Postmentals absent or a small pair may be present, not in contact with each other.
2. No enlarged internasal and postnasal scales, four scales border the naris.
3. Lamellae under 4th toe 17-18.
4. A pair of preanal pores in large preanal scales.
   Snout-vent length 31-34 mm, tail 30-31 mm.

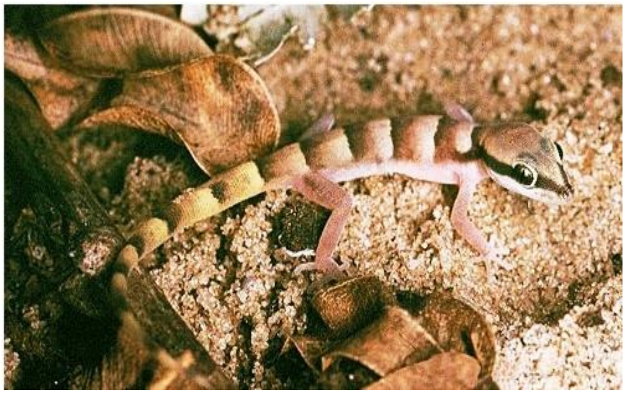


**Fig.5.39.** *Tropiocolotes depressus* Minton & J.A. Anderson

*Colour:*
Dorsum saffron yellow, with a transverse dark band on neck, 3-5 on body, narrower than interspaces, 6 on tail. Ventrum pinkish white. A dark stripe from snout through eye onto neck.

*Habitat*:
The mountain dwarf gecko has been collected from hillsides with sparse vegetation between 1800 and 2000 m. It inhabits crevices among rocks. The gecko is agile, it running on rocks and stones with agility, feeding on soft-bodied arthropods. Its eggs have been found under stones and rocky slabs in humid places (Minton and Anderson, 1965).

*Range:*
The gecko is recorded from hilly tracts north of Quetta, Balochistan.

### 40. *Tropiocolotes persicus (*Nikolsky)

(**Figs.5.40 & 5.30B**)

1. Supralabials 8-10.
2. Two pairs of postmental scales, usually first pair in contact with each other.
3. Interorbital scales 19.
   Total length 25.3 mm, tail 17-18 mm.

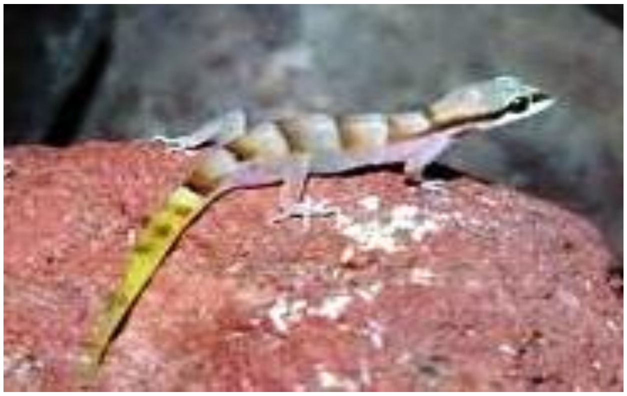


**Fig.5.40.** *Tropiocolotes persicus (*Nikolsky)

*Colour:*
In alcohol dorsum light yellowish. A wide dark brown stripe from nostril through eye extends along dorsolateral sides of the body; 5-7 similar crossbars between neck and base of the tail; 6-10 bands across tail dorsum, head and limbs without pattern, ventrum white.

*Range:*
Extends from southwestern Iran to southeastern Sindh, Pakistan.

### 41. *Tropiocolotes persicus euphorbiacola*

Minton et al.

(**Figs.5.41 & 5.30B**)

1. Dorsal bands, on body, as wide as or narrower than the interspaces.
2. Postmentals 1-3, first in contact with each other.
3. Regenerated tail always yellow.
4. Subdigital lamellae under fourth toe 14.
   Snout-vent length 28-33 mm, tail 32-34 mm.

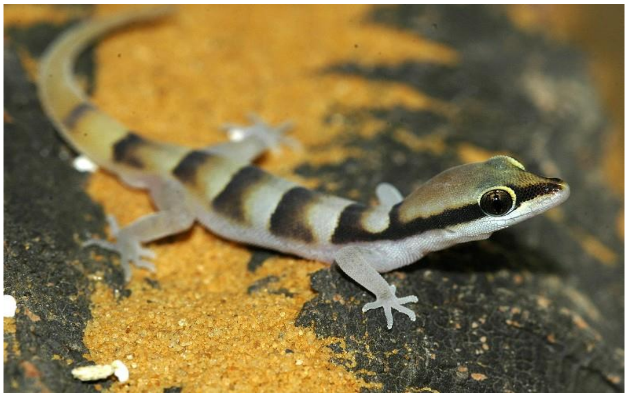


**Fig.5.41.** *Tropiocolotes persicus euphorbiacola* Minton et al.

*Colour:*
Body dorsum pale yellow or amber. Five dark brown transverse bands on body, 8 on tail. A dark stripe from snout to the eye joins first dorsal bar. Ventrum pinkish.

*Habitat*:
It is a widely distributed small gecko in Las

Bela and found to be plentiful in the vicinity of drying dead plants of *Euphorbia caudicifolia* from mid-November to February. The gecko appears to have great affinity with the plant, perhaps it is well protected by its strong thorns. However, in rocky terrain below 200 m, the gecko invades rocks. In warm moist weather the geckos are very active on rocks, slipping from stone to stone with agility, hiding in crevices and holes.

*Range:*
This gecko has been reported from Las Bela, Balochistan and lower Sindh, Pakistan.

# APPENDIX
## Scientific, common English and Urdu names

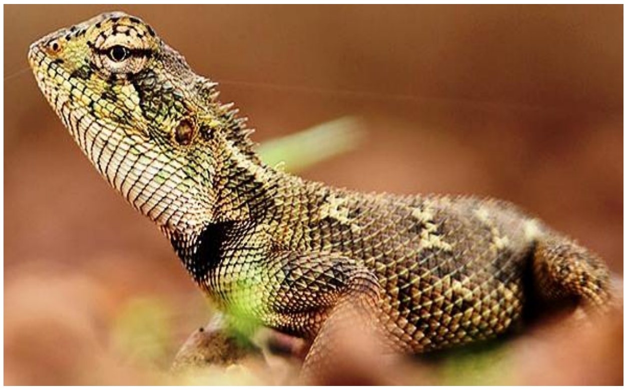
| | | | |
|---|---|---|---|
| EUBLEPHARIDAE | Fat-tail geckos | *Moti dum Chapkalian* | موٹی دم چھپکلیاں |
| *Eublepharis macularius* ( Blyth, 1854) | Fat-tail Spotted Gecko | *Khun khun, Moti-dumn Kirrli* | کُھن کُھن |
| GEKKONIDAE | Geckos | *Chap kalian* | چُھپ کلیاں |
| *Crossobamon lumsdenii* (Boulenger, 1887) | Comb-toed sand gecko | *Kanghi-ungusht chapkali* | ریکستانی کنگی اُنگشت چھپکلی |
| *Crossobamon maynardi* (Smith, 1933) | Striped Sand Gecko | *Dhari-dar chapkali* | دھاری دار کنگھی اُنگشت |
| *Crossobamon orientalis* (Blanford, 1876) | Yellow-tail Sand Gecko | *Pelee-dum chapkali* | زرد دم چھپکلی |
| *Cyrtopodion agamuroides* (Nikolski, 1900) | Makran Spider Gecko | *Makrani makra chapkali* | مکڑا چھپکلی |
| *Cyrtopodion kachhense kachhense* (Stoliczka, 1872) | Kachh Spotted Gecko | *Kachh zavia-ungusht chakali* | کچھ زاویہ انگشت |
| *Cyrtopodion kachhense ingoldbyi* Khan, 1997 | Western Spotted Gecko | *Pachhmi Zavia-Ungusht chapkali* | پچھّمی زاویہ انگشت |
| *Cyrtopodion kohsulaimanai* (Khan, 1991) | Sulaiman Range Gecko | *Koh-Sulaiman Zavia-ungusht chapkali* | سلیمانی زاویہ انگشت |
| *Cyrtopodion montiumsalsorum* (Annandale, 1913) | Salt Range Gecko | *Koh-namak Zavia-ungusht chapkali* | کوہ نمک زاویہ انگشت |
| *Cyrtopodion potoharensis* Khan, 2001 | Potohar Gecko | *Potohar Zavia-ungusht chapkali* | پوٹوہار زاویہ اُنگشت |
| *Cyrtopodion scabrum* (Heyden, 1827) | Tuberculate Gecko | *Ubhar-dar Zavia-ungusht chapkli* | اُبھار دار زاویہ اُنگشت |
| *Cyrtopodion watsoni* (Murray, 1892) | Northern Spotted Gecko | *Shamali Zavia-ungusht chapkali* | شمالی زاویہ انگشت |
| *Hemidactylus brookii* Gray, 1845 | Spotted Barn Gecko | *Tika-dar pista ungusht chapkali* | ٹِکیدار زاویہ آنگشت |
| *Hemidactylus flaviviridis* Rüppell, 1835 | Yellow-belly Gecko | *Zarad shakam kota ungusht chapkali* | زرد شکم کوتہ اُنگشت |
| *Hemidactylus frenatus* Schlegel, 1836 | Waif Gecko | *Janli kota ungusht chapkli* | جنگلی کوتہ اُنگشت |
| *Hemidactylus leschenaultii* Duméril & Bibron, 1836 | Bark Gecko | *Chaal kota-ungusht chapkali* | چھال کوتہ آنشت |
| *Hemidactylus persicus* J. Anderson, 1872 | Persian Gecko | *Irani kota-ungusht chapkali* | ایرانی کوتہ اُنگشت |
| *Hemidactylus triedrus* (Daudin, 1802) | Blotched Gecko | *Chittri kota-ungusht chapkali* | چتری کوتہ اُنگشت |
| *Hemidactylus turcicus* (Linnaeus, 1758) | Mediterranean Gecko | *Turkish kota-ungusht chapkali* | ٹرکش کوتہ انگشت |
| *Indogekko fortmunroi* (Khan, 1993) | Munro Gecko | *Fort Munro zavia-ungusht chapkli* | فورٹ منرو زاویہ آنگشت |
| *Indogekko indusoani* (Khan, 1980) | Soan Gecko | *Soan zavia-ungusht chapkali* | سیون زاویہ اُنگشت |
| *Indogekko rhodocaudus* (Baig, 1998) | Red-tail Gecko: | *Surakh-dum zavia-ungusht chapkli* | سُرخ دم زاویہ اُنگشت |
| *Indogekko rohtasfortai* (Khan & Tasnim, | Rohtas Gecko | *Rohtas zavia-ungusht chapkli* | رہتاس فورٹ زاویہ اُنگشت |

| | | | |
|---|---|---|---|
| 1990) | | | |
| *Mediodactylus walli* (Ingoldby, 1922) | Chitral Gecko: | *Chitrali zavia-ungusht chapkli* | چھیتری زاوایہ آ نگشت |
| *Ptyodactylus homolepis* Blanford, 1876 | Fan-toed Gecko: | *Pankh-ungusht chapkli* | پنکھ اُنگشت |
| *Rhinogecko femoralis* (Smith, 1933) | swollen nose Spider Gecko: | *Nook-dum zavia-ungusht chapkli* | نوک دُم زاویہ اُنگشت |
| *Rhinogecko misonnei* de Witte, 1973 | Long-nose Gecko: | *Nakayli zavia-ungusht chapkli* | نکیلی زاویہ اُنگشت |
| *Siwaligekko battalensis* (Khan, 1993) | Reticulate Plum zavia-ungusht chapkli | *Jal-dar goal-jasm Kirrli* | جالدار گول جسم زاویہ اُنگشت |
| *Siwaligekko dattanensis* (Khan, 1980) | Banded zavia-ungusht chapkli | *Hazara goal-jasm Kirrli* | دھاری دار گول جسم زاویہ اُنگشت |
| *Siwaligekko mintoni* (Golubev & Szczerbak, 1981) | Swati Plump zavia-ungusht chapkli | *Swati goal-jasm Kirrli* | سواتی گول جسم زاویہ اُنگشت |
| *Teratolepis fasciata* (Blyth, 1853) | Flat-tail Gecko | *Chapti-dum chapkili* | چتکبری چپٹی دم زاویہ انگشت |
| *Teratoscincus microlepis* Nikolski, 1899 | Baloch Sand Gecko | *Bloch reg- chipkali* | بلوچستانی ریگ |
| *Teratoscincus scincus keyserlingi* Strauch, 1863 | Turkish Sand Gecko | *Turk reg- chipkali* | تُرکستانی ریگ چُھپکلی |
| *Tropiocolotes depressus* Minton & J. A. Anderson, 1965 | Mountain Dwarf Gecko: | *Chittani chipolia* | پہاڑی چُھپکلی |
| *Tropiocolotes persicus persicus* (Nikolski, 1903) | Persian Dwarf Gecko | *Irani chipolia* | ایرانی چُھپکلی |
| *Tropiocolotes p. euphorbiacola* Minton, Anderson, & J. Anderson, 1970 | Sindh Dwarf Gecko | *Sindhi chipolia* | سندھی چُھپکلی |

# Chapter 6

## Agamidae & Chamaeleonidae

Family Agamidae................................................
Family Chamaeleonidae.....................................



*Brachysaura minor*

### Family Agamidae

There are six genera represented in Pakistan

1. ***Brachysaura*****:** Body depressed; tympanum distinct, small, deeply sunk; caudal scales irregular, tail equals or slightly shorter than body; male without abdominal and preanal callous scales. Single species.

2. ***Calotes*****:** Body compressed; a distinct median dorsal row of pointed elevated scales, extending onto the tail. Tail longer than body. Single species.

3. ***Japalura:*** Body compressed; an indistinct row of elevated scales from head to mid dorsum of body. 2-3 spines at temporal. Single species.

4. ***Laudakia*****:** Body depressed; tympanum distinct**,** large, superficial; fifth toe extends beyond second; caudal scales in distinct annuli. Thirteen species represented.

5. ***Phrynocephalus*****:** Body depressed; tympanum concealed. Six species represented.

6. ***Trapelus*****:** Body depressed; tympanum distinct, small, deeply sunk; caudal scale irregular; tail exceeds body in length; males

with callous preanal scales. Five species represented.

**Key:**

1 Body laterally compressed........................2
Body dorsoventrally depressed.................3

2. Median dorsal row of distinct, pointed, elevated scales, extending to tail ................................*Calotes versicolor*
Median dorsal row of indistinct elevated scales to midbody ....*Japalura kumaonensis*

3. Tympanum distinct...................................4
Tympanum concealed.............................20

4. Tympanum large, superficial; fifth toe extends beyond second; caudals in distinct annuli ........................................................5
Tympanum small, deeply sunk, caudal scale irregular..........................................16

5. Middorsum of body with several rows of homogeneous enlarged scales...................6
Middorsum of body with several rows of heterogeneous enlarged scales.................... ...........................*Laudakia nuristanica*

6. Scales of dorsal rows smooth ...................7
Scales of dorsal rows keeled.....................8

7. Patch of strongly enlarged scales on flanks; male with a patch of callous abdominal scales ................... *Paralaudakia. badakhshana*
Patch of enlarged scales on flanks absent; male without callous abdominal scales ...................*Paralaudakia himalayana*

8. Caudal scales large, less than 30 at the base of tail........................................................9
Caudal scales small, more than 30 at the base of tail...............................................10

9. Head with smooth scales; 8 rows of median dorsal large scales.........*Laudakia pakistanica*
Head with keeled scales; 10 or more rows of median dorsal scales...........................11

10. Large dorsal scale, larger than ventrals; flanks with numerous enlarged scales ............................*Laudakia agrorensis*
Largest dorsal scales, smaller than ventrals, flanks with few enlarged scales ...........................*Laudakia tuberculata*

11. Caudal segments distinct, with 2 whorls of scales; tail short, thick, not exceeding 1.5 times the body length..............................12
Caudal whorls 1 or 3 in a segment, tail long, slender, longer than 1.5 times the body.......................................................13

12. Scales round the midbody 115-188 ......................... *Paralaudakia caucasia*
Scales round the midbody 177-259 .......................*Paralaudakia microlepis*

13. Enlarged dorsals in 12 or more rows; tail segment with 3 annuli; adult with spiny excrescences around ear opening............14
Enlarged dorsals in 10 or fewer rows; tail segments with single whorl; spiny excrescences around ear opening small or absent.....................................................15

14. Supra labials 13-16, enlarged dorsals in 13-16 rows, dorsum yellow brown to sooty black with few yellow specks on back .....................................*Laudakia fusca*
Supralabials 14-18, enlarged dorsals in 16-20 rows, dorsum olive thickly mottled, limbs with yellow.............. *Laudakia nupta*

15. Bright sandy head, with yellow spotted anterior part of the body….*Laudakia lirata*
Brown olive head, with dark reticulation; dorsum with Dark spots interspersed with bright yellow spots....... *Laudakia melanura*

16. Dorsal scales subequal in size, disposed in irregular rows ..........................................17
Dorsal scales larger about twice the size of smaller and are irregular in arrangement.....18

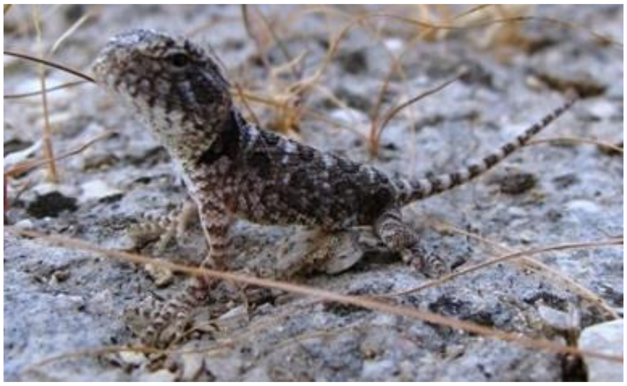
17. Tail exceeds body in length; males with callous precloacal scales ......*Trapelus agilis*
Tail equals or is slightly less than body length; males without callous precloacal scales ........................... *Brachysaura minor*

18. Enlarged dorsal scales rounded; about 100 scales around the midbody........................... ............................*Trapelus rubrigularis*
Enlarged dorsal scales pointed; fewer than 100 scales round the body........................19

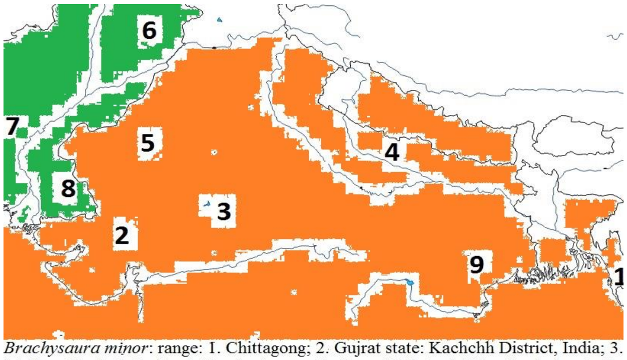
19. Largest dorsals about twice the size of smallest; dorsum with reddish or orange ocelli, with dark borders .............................
............................ *Trapelus megalonyx*
Largest dorsal scales more than twice the size of smallest; dorsal ocelli absent or without dark borders ...................................
...........*Trapelus ruderatus baluchianus*
20. Dorsal scales markedly unequal in size.......21
Dorsal scales subequal............................. 22
21. Enlarged dorsal scales broad, nail-like, with free posterior borders; sides of head and neck without long spinose scales ..................*Phrynocephalus scutellatus*
Enlarged dorsal scales without posterior free border; sides of head and neck with long spinose scales......................................
*Phrynocephalus luteoguttatus*
22. Spinose scales on head and neck absent......23
Spinose scales on head and neck present .................. *Phrynocephalus euptilopus*
23. Nasal scales in contact with each other.......24
Nasal scales not in contact with each other ...................*Phrynocephalus maculatus*
24. Suborbital scale single and elongated .................. *Phrynocephalus clarkorum*
Suborbital scales 2-3...................................
.......................*Phrynocephalus ornatus*

### 1. *Brachysaura minor* (Hardwicke and Gray) (**Fig.6.1**)

1. Habitus stout, head enlarged, body feebly depressed.
2. Head scales large, unequal, strongly keeled or tubercular.
3. Canthus and superciliary sharp.
4. Two spines at tympanum on sides, tympanum diameter almost half that of the orbit.
5. Supra- and infralabials 11 to 15.
6. Body with large, strongly imbricate keeled, often mucronate scales, pointing backward and upward.

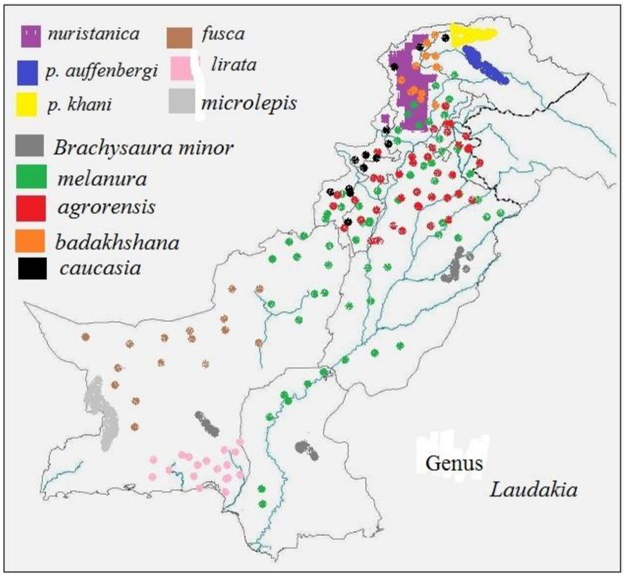


A



*Brachysaura minor*: range: 1. Chittagong; 2. Gujrat state: Kachchh District, India; 3. Madhya Perdesh, India; 4. Banda, Saugor, Ratlam, Allahabad, Uttar Pradesh; , India; 5. Baran, Eastern Rajasthan, India; 6. Rabwah, District Chiniot, Punjab, Pakistan; 7. Mastung, Kalat, Balochistan, Pakistan; 8. Ranikot, District Dadu, Sindh, Pakistan; 9. Satkosia Sanctuary, Orissa.

B



C

**Fig.6.1.** *Brachysaura minor* (Hardwicke and Gray). B shows distribution of *Brachysaura minor* in different parts of Southeast Asia.

7. Ventrals smaller than dorsals, more or less keeled.
8. Scales round midbody 48-58.
9. A denticulate nuchal and dorsal crest.
10. Tail shorter than body, round, with heterogeneous keeled scales.
    Snout-vent length 94-99 mm, tail 92-98 mm.

*Colour*:
Yellowish brown dorsum, with 3 middorsal rows of dark brown light-edged blotches, those of median row larger and rhomboidal. A white streak from nape, bifurcating behind and another from eye to the angle of mouth; limbs with dark crossbars; ventrum yellowish white, throat speckled with gray. Juvenile pinkish brown dorsal blotches edged with light pink.

*Habitat*:
Frequents hard barren desolate deserts. Crepuscular, diurnal in habits, movements sluggish; it does not attempt to escape, rather it flattens itself against the ground and does not move. Burrows in the roots of grasses and thorny bushes.

*Range*:
Rare, spottily distributed widely in the Indo-Gangetic plains, from Bangladesh through the Central and United Provinces of India into the upper and lower Indus Valleys in Pakistan, where definite records are from Sindh and Punjab, District Jhang.

### ***2. Calotes versicolor versicolor*** (Daudin) (**Fig.6.2**)

1. Forehead concave; head with unequal, smooth, or feebly keeled scales.
2. A pair of well separated supraorbital spines.
3. Diameter of tympanum half or less than half that of the orbit.
4. Dorsals 35-52 around midbody, keeled, all pointing backward and upward, larger than ventrals. Ventrals keeled.
5. A median row of elongated, sharp tipped dorsals, arranged in a crest which extends from nuchal to the level of vent, progressively decreasing in size backwards.
6. Third and fourth fingers nearly equal fourth toe longer than third. Sexually dimorphic, males longer, have a larger body mass, a prominent gular region, cheeks and longer dorsal spines; develop bright colour pattern at the beginning of rainy season.
   Snout-vent length 135-140 mm, tail 338-350 mm.

*Colour*:
Highly metachromatic, colour changes according sex. Normally body is uniformly light brown or grayish dorsum, with distinct dark brown transverse spots or bars, or variegated with dark brown. Dark streaks radiate from eyes. Juveniles and females often with a pair of dorsolateral stripes on body dorsum, tail with light and dark annuli, ventrum dirty white. Adult male is usually more or less uniform in colour with greenish tinge, throat is dark-barred.

*Habitat*:
The tree lizard is arboreal and diurnal. It inhabits forests and any situation with trees and shrubs. It invades different biotopes from dry deserts to thick forests throughout the Indo-Pakistan subcontinent and Southeast Asia, from the plains to about 2000 m above sea level, common in gardens and groves.

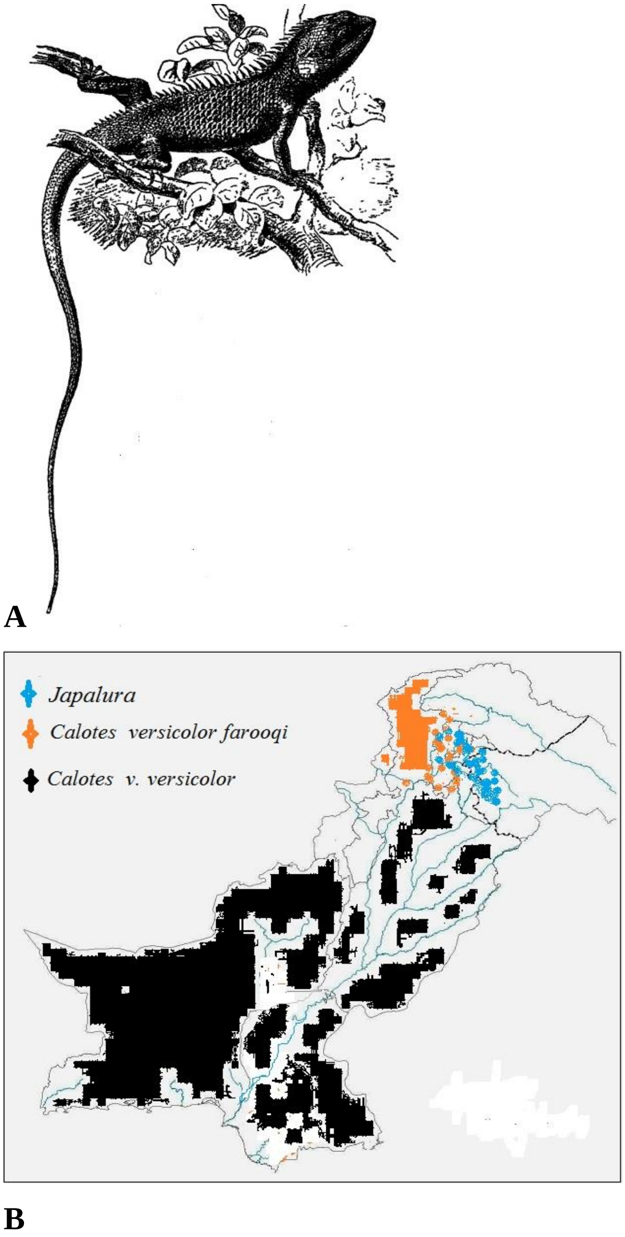


**Fig.6.2.** *Calotes versicolor versicolor* (Daudin). B shows distribution of *Japalura* and species of *Calotis* in different parts of Pakistan.

### ***3. Calotes versicolor farooqi*** Auffenberg and Rehman

Distinguished on the basis of: short head, lateral body scales pointing upwards and backwards, prescapular fold or pit absent

*Range*:
Alpine Punjab, Pakistan.

### ***4. Japalura kumaonensis*** (Annandale)

(**Fig.6.3**)

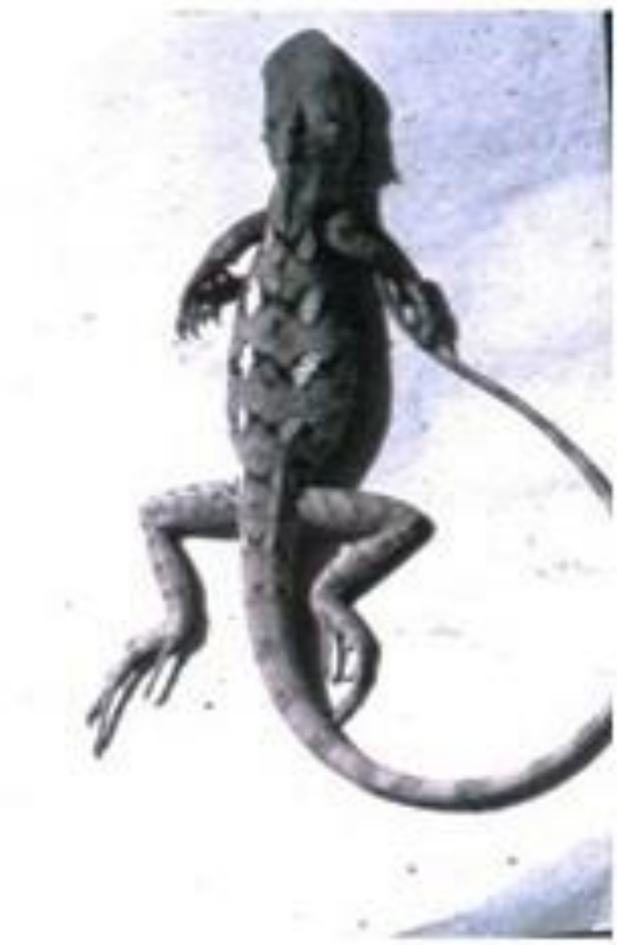


**Fig.6.3.** *Japalura kumaonensis* (Annandale).

*Colour*: Body gray to dark brown, with a median row of triangular dark markings edged with white.

1. Body compressed.
2. Dorsals heterogeneous.
3. Dorsal crest a mere denticulation, reaches to the midbody.
4. No preanal or femoral large scales.
5. Supralabials 6.

6. Fourth toe as long as tibia.
   Snout-vent length 60-63 mm, tail 123-127 mm.

*Habitat*:
Characteristic of low hilly tracts, with moderate vegetation in mesic habitat

*Range*:
Recorded from Hazara District in eastern, Pakistan. Its range extends to Kumaon District in western Himalayas, India.

### ***5. Laudakia agrorensis*** (Stoliczka)
**(Figs.6.4 & 6.1C)**

1. Head with keeled scales.
2. Numerous spinose scales on sides of head and neck.
3. Median dorsals distinctly larger than ventrals and strongly keeled, arranged in 8-12 longitudinal rows, an intervening vertebral series of small scales may be present, which extend to the occiput.
4. Flanks of body with numerous enlarged strongly keeled scales.
5. In addition to the callose preanal scales an oblong patch of large callose scales is present along the flanks of the body.
6. Tail segmented, with three whorls, round the base of tail 30-40 scales.
   Snout-vent length 105-110 mm, tail 245-250 mm.

*Colour*:
Dorsum dark olive, spotted and reticulated with dark spots usually arranged in longitudinal series; head paler, ventrum uniformly whitish, throat and chest heavily marbled with dark blue. Juveniles have variegated dorsum spotted with black and pale yellow, or there are three longitudinal yellow dorsal stripes, the median extending onto the tail; throat is reticulated with dark while rest of the ventrum is dirty white.

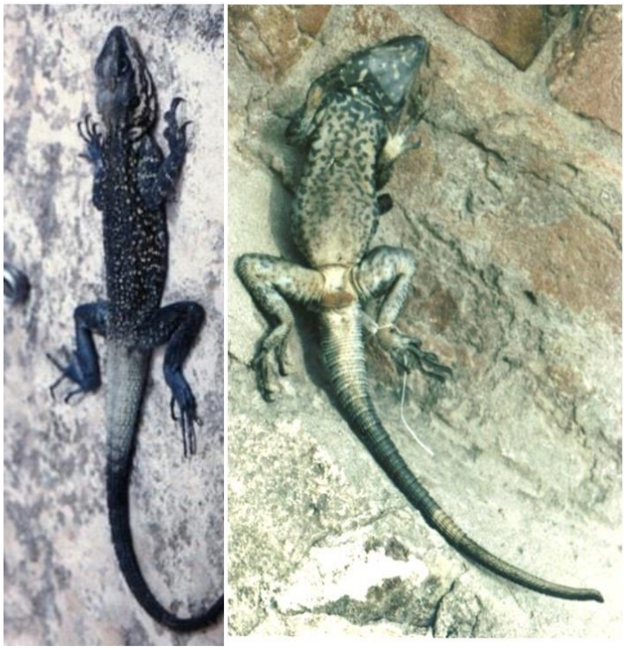


**Fig.6.4.** *Laudakia agrorensis* (Stoliczka).

*Habitat*:
The Agrore valley agama is very common around Ooghi Fort, in District Manshera, Khyber Pakhtunkhwa, Pakistan. It lives in crevices among rock blocks.

*Range*:
Widely distributed in Ooghi Valley, around Manshera and Abbottabad, extending down into the Jhelum Valley, and northward into Chitral.

### ***6. Laudakia fusca*** (Blanford)
**(Figs.6.5 & 6.1C)**

1. Large sized agama, with large head.
2. Circum-auditory spiny excrescences are more numerous and prominent.
3. Enlarged mid-dorsals in 13-16 rows are strongly mucronate.
4. Tail annuli composed of 3 whorls.
5. Callous patch in male.
   Snout-vent length 159-162mm, tail 289-300 mm.

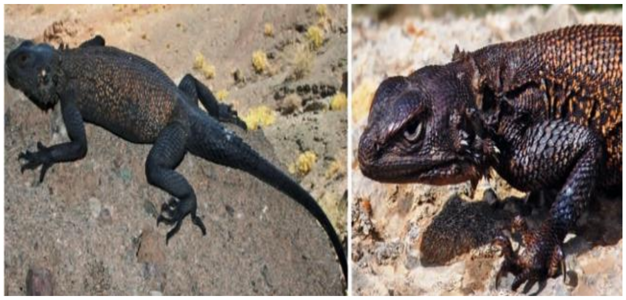


**Fig.6.5.** *Laudakia fusca* (Blanford).

*Colour*:
Head of male bright yellow, body, limbs and tail dark brown to sooty black above and below, with few yellow speckles on back. Callose abdominal and preanal scales are reddish brown. Females light brown to reddish, with slight speckles of yellow. Tail distally dark, ventrum yellowish.

Juvenile grayish yellow, with narrow yellow irregular crossbars, or a reticulate pattern. Head black with a large yellow mark on top and similar spots on temporal, occiput, neck, and shoulders. Tail banded dark.

*Habitat*:
Frequents vertical rocks along ravines with a lot of holes and crevices. When disturbed it takes to the rocks, waits for some time observing the intruder from behind the rocks, then scrambles about freely. It forages far and wide in nearby low-lying strips of land with grassy growths and occasional bushes.

*Range*:
Widely distributed in southern Iran, Baluchistan, and southwestern Sindh, Pakistan, up to an elevation of 1800 m. The author has seen it in the Kalabag area in northwestern Punjab, Pakistan.

### *7. Laudakia lirata* (Blanford)

(**Figs.6.6 & 6.1C**)

Distinguished from *Laudakia melanura* by:

1. Bright sandy head and yellow spotted anterior part of body.
2 Strongly keeled dorsals.
Snout-vent length 121-135, tail 225-285 mm.

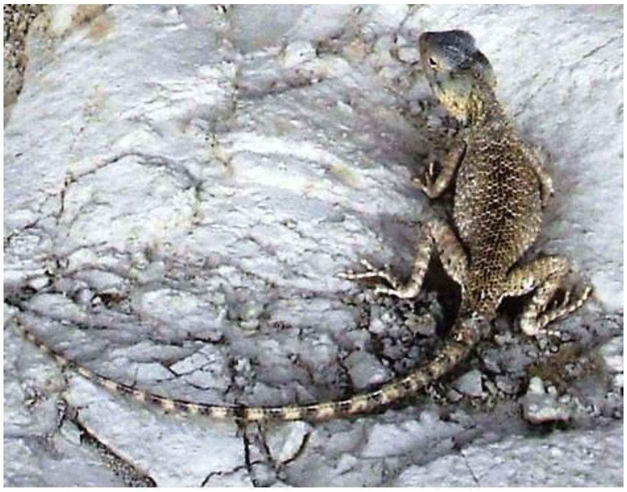


**Fig.6.6.** *Laudakia lirata* (Blanford).

*Range*:
From Kirthar range, Hab Chauki, Mekran Coast, and Astola Island.

### *8. Laudakia melanura* Blyth

(**Fig.6.**7 **& 6.1C**)

1. Naris piercing canthus.
2. Head with large, subequal, smooth, or obtusely keeled scales.
3. Supralabials 12 to 16.
4. Posterior lateral sides of head with groups of short spines.
5. Neck scales granular, except those of median line which form a low crest.
6. Ventrals smooth, not half as large as median dorsals.
7. Gulars smaller than ventrals. A gular sac is absent.
8. Tail depressed, oval, covered at base with large subequal scales, dorsal and lateral caudal scales strongly mucronate, ventral caudals are flat.

Snout-vent length 140-145 mm, tail 280-295 mm.

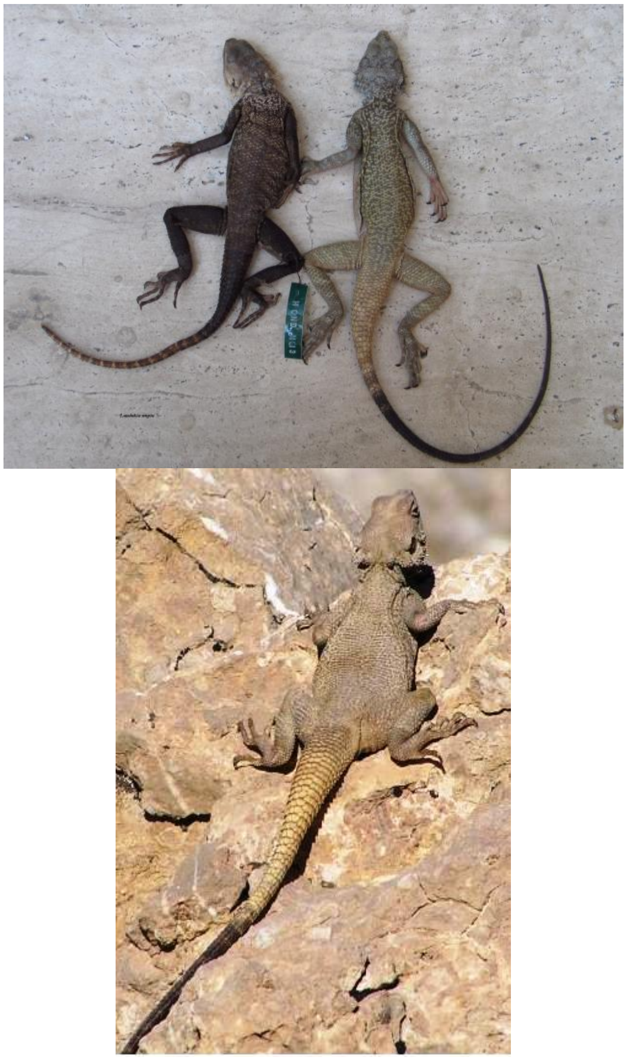


**Fig.6.7.** *Laudakia melanura* Blyth.

*Colour*:
In life, dorsum brownish olive with smaller more or less confluent dark spots, interspersed with large bright yellow spots; a dark reticulation on head; tail pale yellowish at base, but for greater part of its length entirely black. Body dorsum in young olive, yellowish white ventrum, head, chin, chest reticulated with black; neck, body, limbs, and base of tail with numerous small black and yellow spots; eyelids and superciliary ridges yellow; tail dusky black at its tip.

*Habitat*:
Mountain species, feeds on vegetation, occasionally taking insects.

*Range*:
Recorded from rocks of moderate elevation from eastern Iran, Balochistan, extending into the Salt Range, Punjab, and western hilly tracts of Sindh, Pakistan.

*Two races*:
Scales around midbody 120-150. Male with a large patch (4-5 rows) of callose preanal and another at mid-abdomen......................................
......................*Laudakia melanura melanura*
Number of scales round midbody more than 150. No patch of spinose scales on flanks...........
............................*Laudakia melanura nasiri*

### 9. *Laudakia nupta* (de Filippi)
(**Fig.6.8**)

1. Head scales subequal, smooth, or obtusely keeled.
2. Supralabials 14 to 18.
3. Posterior sides of head and neck with numerous groups of long spines, while rest of scales of the region are granular, except those of median dorsal line which form a low crest.
4. Median dorsals homogeneous, imbricate, broader than long, keeled, mucronate, arranged in 16-20 oblique series with a middorsal convergence.
5. Flanks of the body with very small scales pointed backward and downward, without enlarged scales.
6. Ventrals smooth, smaller than dorsals, gulars smaller than ventrals.
7. Tail depressed, oval, segmented, each segment with more than 2 whorls, or

segments are indistinct. The caudal scales are large, subequal, mucronate**;** subcaudals are flat.

8. Males with 3 or 4 rows of callose preanal scales and a midabdominal patch of similar scales.

Snout-vent length 170-172 mm, tail 289-305 mm.

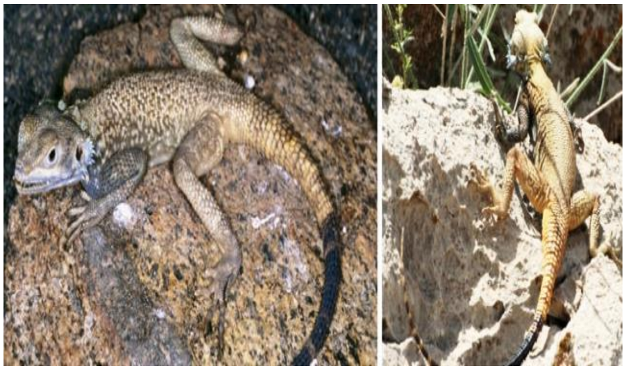


**Fig.6.8.** *Laudakia nupta* (de Filippi).

*Colour*:
Dorsum olivaceus, thickly speckled or mottled**,** limbs with yellow, tail similar or uniformly brownish, or banded with black, or its posterior half may be dark. Flanks marbled with gray and yellow. Ventrum yellowish brown, throat with large dark-blue spots.

*Habitat*:
This agama is shy and inhabits mountain peaks, taking shelter in crevices among rock blocks at an elevation of 1800-2000 m.

*Range*:
From eastern Iraq, Afghanistan, Iran, Balochistan to southwestern Sindh**,** Waziristan Hills in Khyber Pakhtunkhwa and Kalabag area in northwestern Punjab, along the western bank of the Indus.

### *10 Laudakia nuristanica* Anderson and Leviton (Figs.6.9 & 6.1C)

1. Head, body, and tail strongly depressed, tail longer than body, segmented, each segment of 4 whorls; 45 scales around base of the tail.
2. Tympanum large, superficial. Three clusters of enlarged spinose scales around tympanum, and a pair on neck.

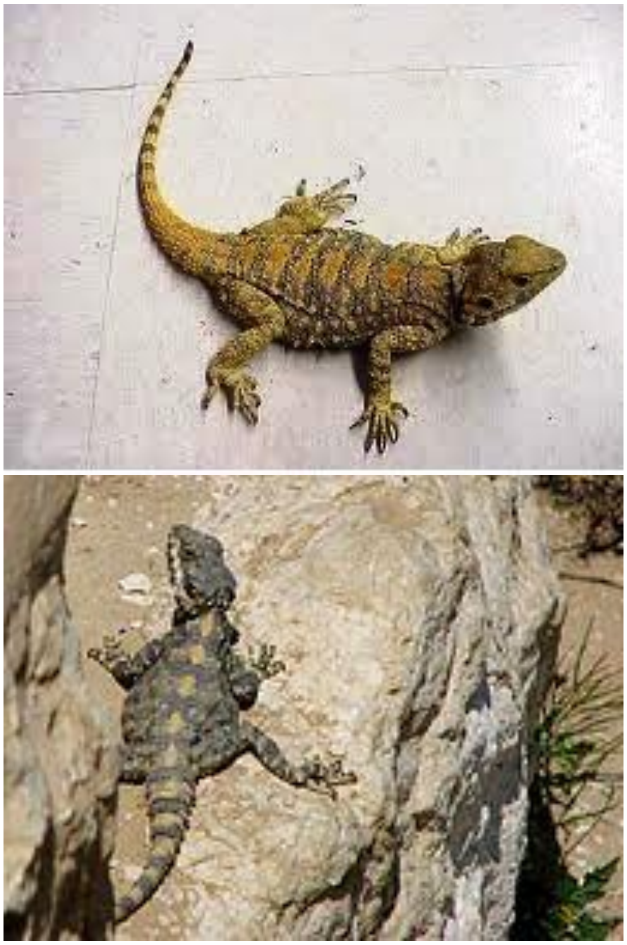


**Fig.6.9.** *Laudakia nuristanica* Anderson and Leviton

3. Median dorsals heterogeneous, not arranged in regular rows, with few strongly keeled scales which are about twice as large as largest ventrals, dorsolaterals granular, flanks with scattered enlarged scales, not in groups.
4. Limbs with strongly heterogeneous spiny scales.
5. Naris in a large scale below canthus.

6. Supralabials 13, infralabials 11-12.
7. A preanal patch of 7 rows of callose scales, another at midabdomen of 17 rows.
   Snout-vent length 130-135 mm, tail 238-250 mm.

*Colour*:
In formalin, olive brown above, head and limbs dark gray, corners of eyelids cream, 3 short dark bars on supracilliaries, median descending across eye; enlarged middorsals light gray interspersed with dark flecks; enlarged tubercles on flanks, light gray, contrasting sharply from olive brown ground colour; ventrum dirty white mottled with gray, throat with cream spots; posterior two-thirds of tail very dark brown, nearly black; fingers and toes barred with dark.

*Habitat*:
Inhabits crevices among wet rocks and boulders along water courses in a conifer biotope of evergreen forests at 500-600 m of elevation.

*Range*:
This species has recently been recorded from Ziarat, Khyber Pakhtunkhwa, Pakistan.

### ***11. Laudakia pakistanica*** (Baig)
(**Fig.6.10**)

1. Head scales smooth.
2. Distinct 8 rows of middorsal spinose scales.
3. Vertical rows of enlarged spinose scales on flanks.
4. In male 6 and in female 3 precloacal callose scales.
5. Number of scales round the base of tail 30-40.
6. A distinct patch of large spines on flanks.
7. Tail segments with 3, rarely 4 whorls.
   Snout-vent length 150 mm, tail 240+ mm.

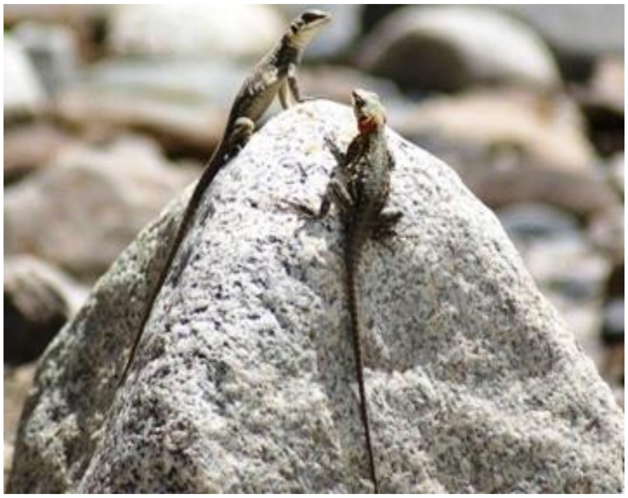


**Fig.6.10.** *Laudakia pakistanica* (Baig).

*Colour*:
In formalin, dorsum jet black, chest, neck, and gular region speckled with orange; ventrum dark gray; groin speckled with yellow.

*Habitat*:
The rock agama inhabits dry barren rocky mountains away from human settlements.

*Range***:**
Widely distributed around Gilgit to Manshera, northeastern Pakistan, along the River Indus.

*Three subspecies:*
Midbody scales 150-166; dorsum dull dark brown-gray, with white bars, head and distal part of tail black. Gular region bluish black with irregular pale yellow blotches, ventrum pale yellow with thick dark ........................................... reticulation........ *Laudakia pakistanica auffenbergi*
Midbody scales 146-158; dorsum silver gray with black mosaic, head black with scattered light scales; limbs barred with black .................. *Laudakia pakistanica khani*
Midbody scales 168-178; uniform jet black, Head speckled below with yellow orange .........*Laudakia pakistanica pakistanica*

### 12. ***Laudakia tuberculata*** (Hardwicke and Gray)
(**Fig.6.11**)

1. Head with heterogeneous, convex, smooth, or keeled scales.
2. Posterior sides of head and neck with small spinose scales; those around ear arranged in series, while on neck in groups which are sometimes absent; rest of the neck scales are granular.
4. Median dorsals subequal, roundish, imbricate, keeled; 10-15 across the midback.
5. Flanks with small scales, and few scattered enlarged keeled scales.
6. Ventrals smooth, as large as the dorsals.
7. Gulars much smaller than ventrals, no gular sac.
8. Skin of neck loose.
9. Tail depressed, segmented with four whorls of subequal strongly keeled scales, more than 40 at thickest part.
10. Male with 6-7 rows of callose preanal scales and an elongated midabdominal patch.

   Snout-vent length 145-150 mm, tail 150-160 mm.

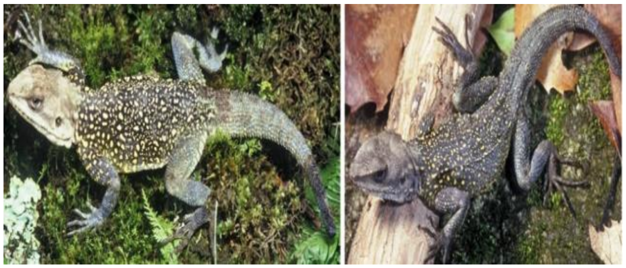


**Fig.6.11.** *Laudakia tuberculata* (Hardwicke and Gray).

*Colour*:
In juvenile, dorsum is dark olive brown, with numerous dark spots arranged in longitudinal series on sides of a light vertebral line. In adult, dark spots tend to break and are replaced by a mixture of dark brown and yellowish specks. Head pale, ventrum whitish or brown, throat and often chest heavily marbled with dark blue.

In life, male is gorgeously colored; shoulders, chest, and flanks are spotted with bright yellow or orange. In adult male, ventrum is of bright bluish black tinge with purple on throat, sides of neck, shoulders, and belly.

*Habitat*:
Commonest agamid in the western Himalayas, inhabits rock blocks at elevations of 1500-2500 m. The lizard is predominantly herbivorous, occasionally resorting to insectivory.

*Range*:
Reported from eastern Afghanistan, northern Pakistan, and Kashmir up to Nepal.

### 13. ***Paralaudakia badakhshana***
(Anderson and Leviton)
(**Figs.6.12 & 6.1C**)

1. Head Scales smooth.
2. Scales around tail in distinct 2-4 whorls, scales round base of the tail 19-25.
3. Middorsals enlarged, smooth or weakly keeled, distinctly larger than ventrals.
4. A patch of large mucronate scales on flanks, and large patch of callous scales at abdomen.

   Snout-vent length 65-70 mm, tail 99-108 mm.

*Colour*:
Dorsum olive gray, enlarged dorsals uniformly gray, bordered by longitudinal rows of irregular dark spots; dark-edged white ocelli are arranged in oblique rows on back, flanks mottled with dark gray. Tail with small dark spots arranged as cross bars. Ventrum grayish white, limbs marbled with gray, digits barred.

*Habitat*:
The lizard inhabits rocks between 450 and 2400 m of elevation. It has been collected from clay

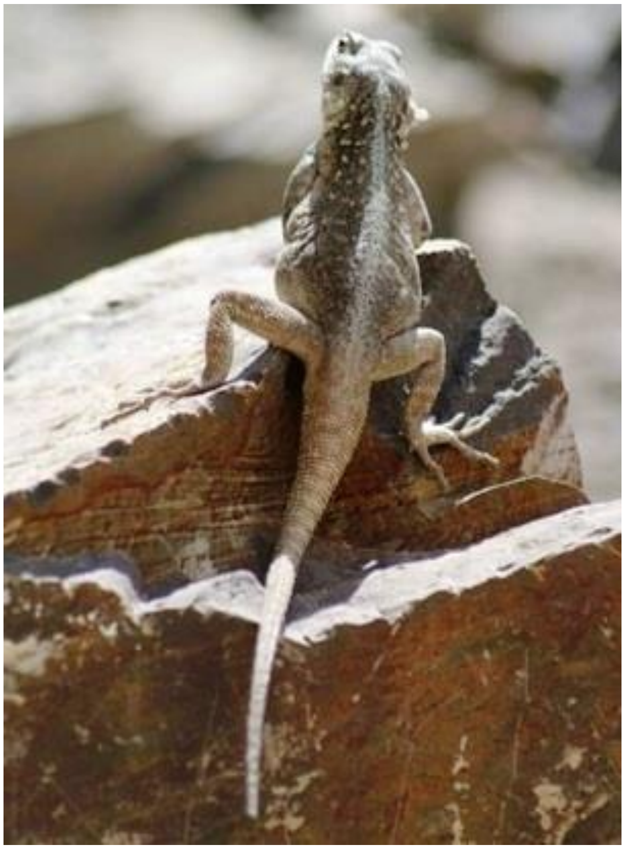


**Fig.6.12.** *Paralaudakia badakhshana* (Anderson and Leviton).

loess, slopes, and plateau rock structures, dry water courses, and in dry mountain habitat.

*Range*.
Afghanistan, Sost and Gulmit, near Khunjrab Pass, in northeastern Pakistan.

### 14. ***Paralaudakia caucasia*** (Eichwald) (**Figs.6.13 & 6.1C**)

1. Head top with heterogeneous scales, smallest on the upper eyelid. Posterior sides of head and neck with numerous groups of large spinose tubercles, rest of neck scales very small.
2. Supralabials 12 to 16.
3. Median dorsals more or less hexagonal, imbricate, smooth or obtusely keeled, 6-10 across midback, abruptly separated from very small dorsolaterals.
4. Lateral scales of body intermixed with large squarish spinose scales and a large patch on flanks is usually present.
5. Tail depressed at base, oval in cross section, covered with large spinose scales, segmented, 2 whorls to a segment.
   Male with 4-5 rows of callose preanals, and an elongated midbelly patch.
   Snout-vent length 143-145 mm, tail 185-205 mm.

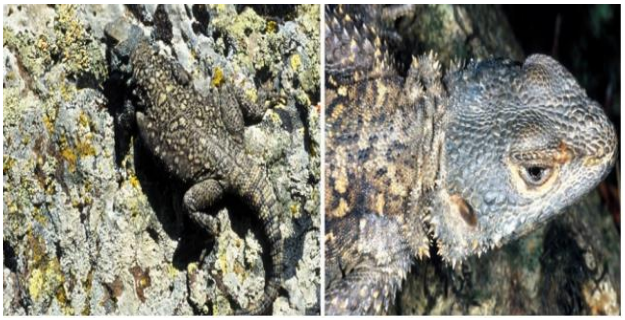


**Fig.6.13.** *Paralaudakia caucasia* (Eichwald).

*Colour*:
Olivaceus or yellowish brown above, with yellow or black markings; body dorsum with pale yellow spots bordered with black, spots may coalesce into a median row of crossbars, more vivid in anterior half of body. Head uniformly yellow or spotted with black. Tail yellowish or olivaceus, with or without dark annuli, yellowish below. Throat heavily marbled with dark blue or black; belly and under surface of limbs dark blue.
Young grayish or olivaceus above with jet black spots, which may join each other to form narrow crossbars.

*Habitat*:
Frequents boulders in stream beds, living in crevices among rock blocks.
*Range*:
Waziristan and northern Balochistan, between 1800 and 3000 m.

### *15. Paralaudakia himalayana (*Steindachner) (**Fig.6.14**)

1. Head scales heterogeneous, convex, smooth or keeled, largest on snout.
2. Posterior side of head and neck with small spinose scales, periauricular spines arranged in rows while those on neck in groups, neck scales granular.
3. Supralabials 10 to 12.
4. Median dorsals subequal, round, imbricate, feebly keeled, 8-14 across middorsum.
5. Laterals small, with no enlarged scales, adult male may have a patch of large scales at midventrum of body.
6. The skin is loose on sides of neck and body, ventrals smooth, smaller than median dorsals. Gulars smaller than ventrals, no gular sac.

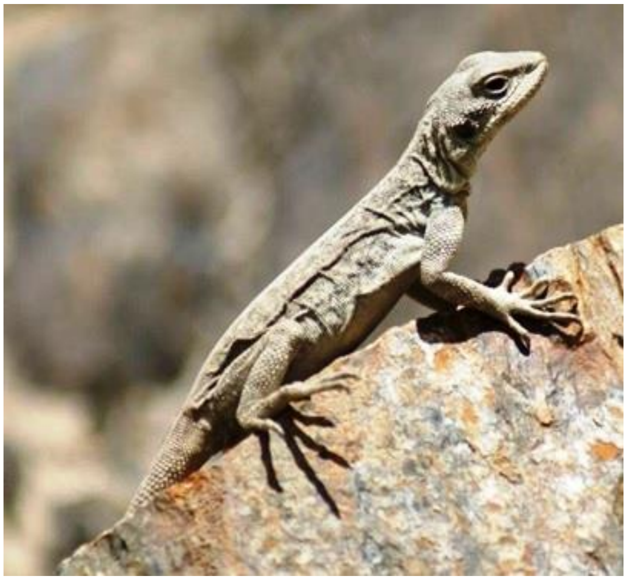


**Fig.6.14.** *Paralaudakia himalayana (*Steindachner).

7. Hind limb reaches to the ear or eye.
8. Tail depressed at base, oval in cross section, 40 or more strongly keeled subequal scales around its thickest part.
9. Male and female have 2-3 rows of callose preanal scales, no abdominal patch.

Snout-vent length 100-105 mm, tail 139-148 mm.

*Colour*:
Dorsum olive, marbled with black, round light spots may form a network; sometimes a dorsolateral series of black spots or spots may join to form sinuous groups. Tail barred with black, greenish white below, throat of male spotted or marbled with gray.

*Habitat***:**
Recorded from remote areas of northern Pakistan, between 3000 and 3200 m of elevation. It is active by April, and becomes common on rocks by May-June. It feeds on vegetation and occasionally on lizards and arthropods.

*Range*: From the western Himalayas to Tajikistan. In Pakistan it has been recorded from Gilgit and Chitral.

### **16.** ***Paralaudakia microlepis*** (Blanford) (**Figs.6.15 & 6.1C**)

1. Close to *Laudakia caucasica* differing from it by having: Scales around the midbody 177-235 in male, 190-259 in female (Anderson, 1999).
2. A single male, collected from 5 miles N of Koh-a-Taftan, western Balochistan, with 195 midbody scales,
   Snout-vent length 135, tail 125 mm.

*Colour***:**
Body dorsum darker than lighter tail

*Natural history note***:**
Collected from out crop of rocks. Sighted several lizards, caught one.

*Range***:**
Widely distributed in southern, central, and eastern parts of Iranian Plateau rare in Pakistan.

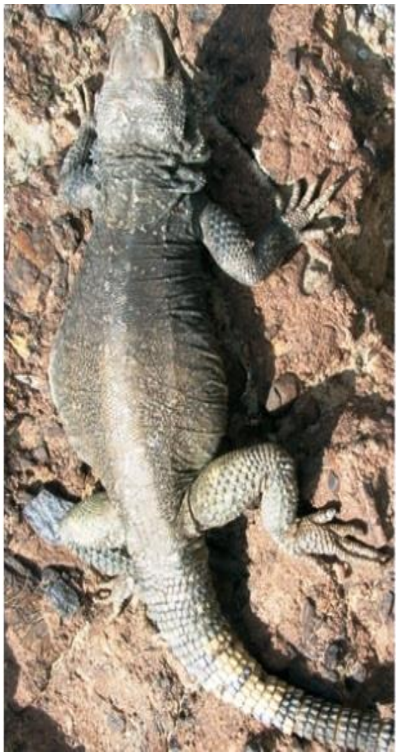


**Fig.6.15.** *Paralaudakia microlepis* (Blanford)

## 17. ***Phrynocephalus clarkorum***

S. Anderson and Leviton

(**Fig.6.16**)

1. Nasals in contact with each other.
2. A single elongated suborbital scale.
3. Dorsals subequal in size.
4. No spiny scales on head and neck.
5. Both sides of fourth toe and lateral aspect of third, fringed with pointed scales.

   Snout-vent length 40-45 mm, tail 50-54 mm.

*Colour*:

Dorsum sandy gray with two rows of dark spots along middorsum. A distinct, dark-lined dorsolateral light stripe, from posterior angle of eye, extending along body, onto tail. A series of elongated oval brown spots down the vertebral line, linked by a lighter chain. Ventrum white, underside of tail yellow-green in life, with 5 dark crossbars, tip white.

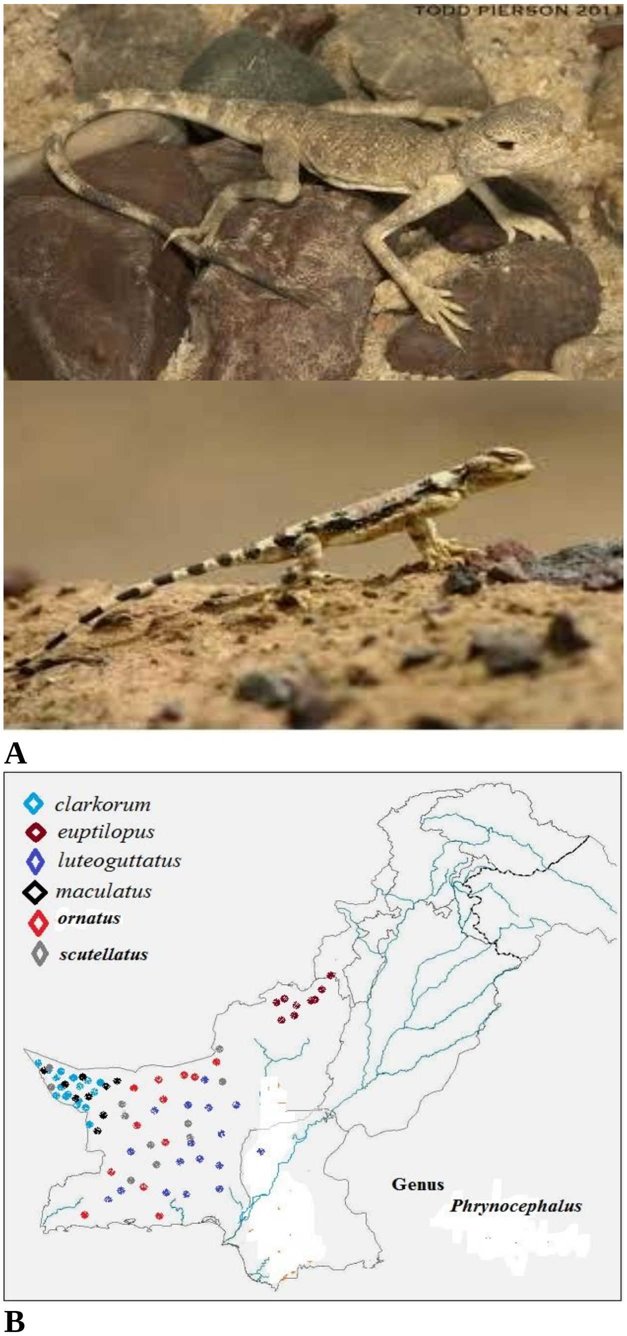


**Fig.6.16.** *Phrynocephalus clarkorum* S. Anderson and Leviton.

*Habitat*:

The striped toad agama is adapted to varying ecological conditions: large active sand dunes, strips of firm sand, narrow ridges of hard soil, gravel plains and stony wastes, interspersed in the general scenario of a continuous sea of sand. Intervening strips of hard soil support grass tussocks, stunted bushes, and low xerophytic shrubs. The agama quickly takes to a nearby shelter where it remains motionless and undetected; however, where no shelter is available it quickly buries itself in sand.

*Range*:
Recorded from the sandy deserts of southern Afghanistan and western Balochistan.

### *18. Phrynocephalus euptilopus* Alcock and Finn
**(Figs.6.17 & 6.16B)**

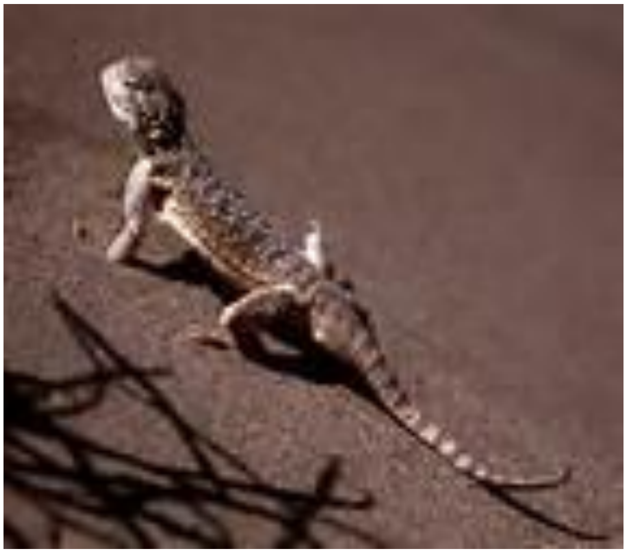


**Fig.6.17.** *Phrynocephalus euptilopus* Alcock and Finn.

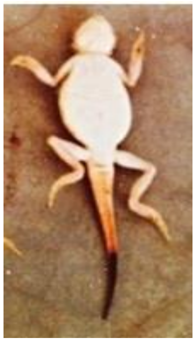
1. Dorsals subequal.
2. Spinose scales on head and neck.
3. Nasals in contact with each other or partially separated.
4. Hind limb reaches to the eye.
5. Digits long, with well developed lateral denticulations, length of which exceeds digit's breadth.
   Snout-vent length 60-63 mm, tail 63-65 mm.

*Colour*:
Dorsum sandy, with black speckles. Head with irregular blotches. Five rounded spots on nape and shoulder. Ventrum whitish, tail tip black.

*Habitat*:
Nothing is known about its natural history.

*Range*:
Reported from Darband, Balochistan, at an elevation of 900 m.

### 19. *Phrynocephalus luteoguttatus* Boulenger
**(Figs.6.18 & 6.16B)**



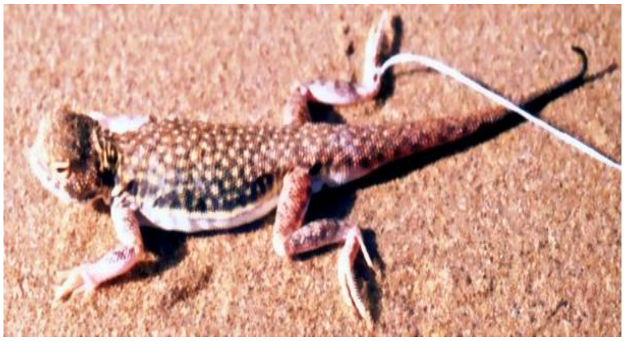


**Fig.6.18.** *Phrynocephalus luteoguttatus* Boulenger.

1. Dorsals markedly heterogeneous.
2. Sides of head and neck with long spinose scales.
3. Nasals in contact with each other or partially separated.
4. A series of elongated scales bordering head crown from front.
5. Hind limb reaches to eye.

6. Digits strongly denticulate, length of denticulation equals breadth of toe.
   Snout-vent length 44-47 mm, tail 43-45 mm.

*Colour*:
Dorsum gray to blue-black, with numerous irregularly scattered small round yellow spots. Limbs sandy to pinkish. Anterior half of tail pinkish, while posterior black. Ventrum white.

*Habitat*:
Chacteristic of fine windblown sand dunes with sparse stunted bushy vegetation. It is sluggish, moving rather slowly on the sand dunes. It usually it keeps its short tail parallel to its body; when excited it repeatedly curls its tail up and straightens it. It buries itself in sand by displacing it with rapid lateral shivering movements of its body, practically sinking itself into the sand, leaving a characteristic impression of its body on the surface, indicating from where it can be picked up.

*Range***:**
Known from western Balochistan around Nushki, southward to Las Bela, northward it extends into southern Afghanistan and western Iran.

### ***20. Phrynocephalus maculatus*** J. Anderson
(**Figs.6.19 & 6.16B**)

1. Dorsals subequal.
2. No spinose scales on sides of head and neck.
3. Nasals separated by 1-2 scales.
4. Mental larger than adjacent labials.
5. Outer borders of third and fourth toe feebly denticulate.
   Snout-vent length 70-74 mm, tail 115-120 mm.

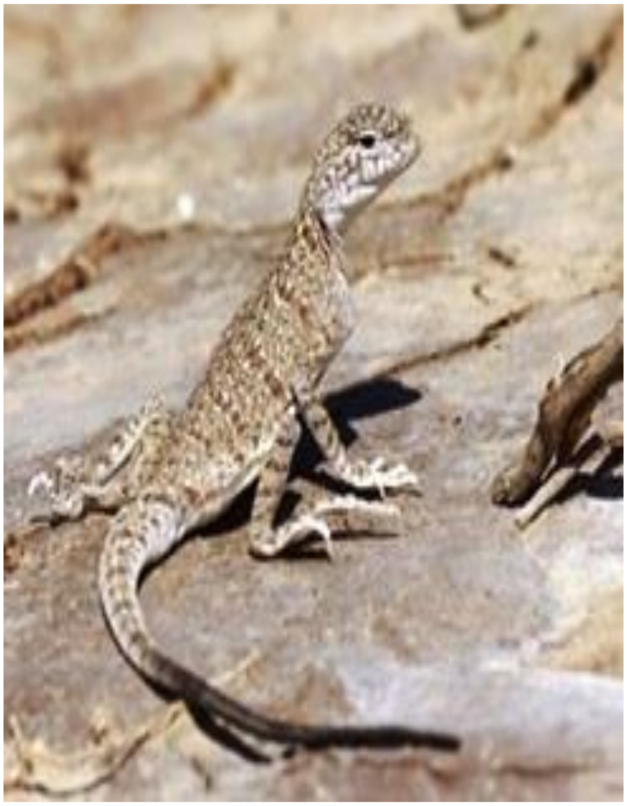


**Fig.6.19.** *Phrynocephalus maculatus* J. Anderson.

*Colour*:
Dorsum sandy brown or grayish, speckled with black and white or dull yellow. Limbs with faint dark bars, sometimes with black spots which may unite to form crossbars on body and limbs. Distal one-third of tail black. Ventrum dirty white.

*Habitat*:
The whip tail toad agama prefers tracts of hard soil among sand dunes, close to scrubby growth. This vegetation supports various types of deserticolous arthropod populations which form the primary diet of this agama; it also feeds on leaves and twigs.

*Range*:
Wide ranging from Arabia, Iraq, Afghanistan, and Iran to western Balochistan, Pakistan.

### *21. Phrynocephalus ornatus* Boulenger
(**Figs.6.20 & 6.16B**)

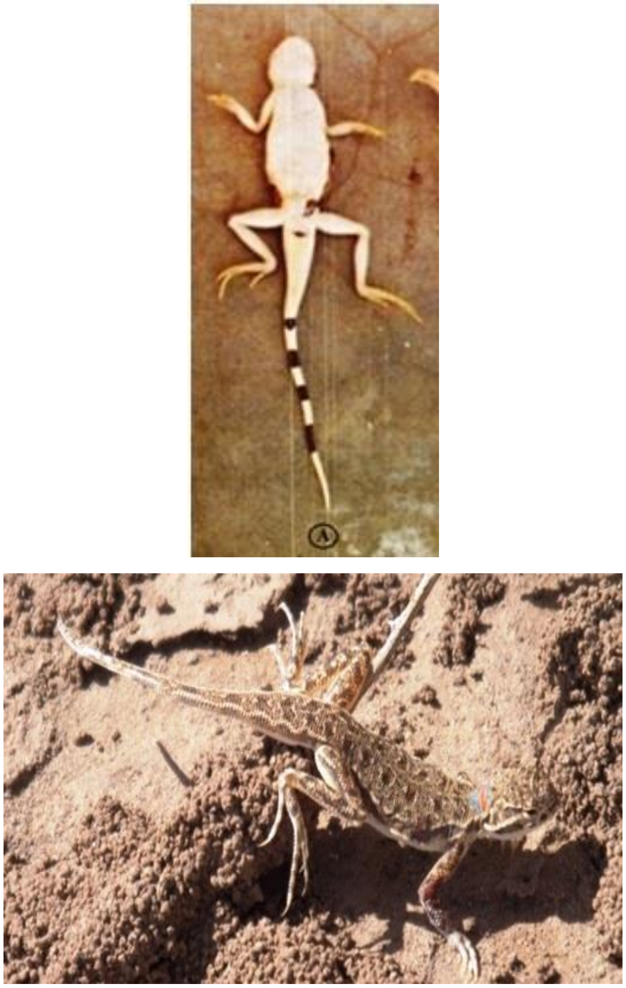


**Fig.6.20.** *Phrynocephalus ornatus* Boulenger.

1. Dorsals subequal.
2. No spinose scales on sides of head and neck.
3. Nasals in contact with each other or partially separated.
4. Suborbital scales 2-3.
5. Hind limb reaches to naris or beyond.
6. Outer borders of third and fourth toes denticulate, denticulation size equals the breadth of toe.

   Snout-vent length 42-47 mm, tail 50-54 mm.

*Colour*:

The striped toad agama is light gray to sandy brown, with 1-3 pairs of reddish spots and scattered dark dots. A dorsolateral white to light yellow stripe, bordered with black. Tail ventrum pale yellow, with 4 or 5 dark crossbars, body ventrum white.

*Habitat*:

Inhabits windblown sand dunes with sparse vegetation of stunted bushes.

*Range*:

Known from the Chagai Desert, extends to Las Bela in the south and to southern Afghanistan in the north and west to southeastern Iran.

### 22. *Phrynocephalus scutellatus* Olivier
(**Figs.6.21 & 6.16B**)

1. Dorsals unequal.
2. Head and neck sides without spinose scales.
3. Nasals in contact with each other, rarely separated by scales.

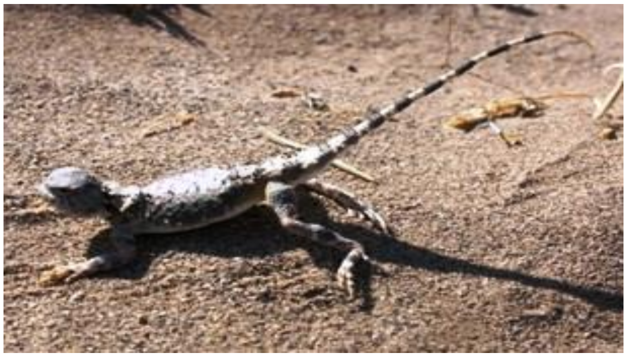


**Fig.6.21.** *Phrynocephalus scutellatus* Olivier.

4. Mental larger than adjacent labials.
5. Outer borders of third and fourth toes denticulate, length of which equals the breadth of toe.

   Snout-vent length 50-56 mm, tail 72-78 mm.

*Colour*:
Grayish or brownish above, with light and dark markings, flanks darker. A median dorsal broad crimson stripe in adults. Limbs and tail barred. Ventrum white, with 6-7 dark bands under tail.

*Habitat*:
Characteristic of hard stony terrain with sparse vegetation. It is very active and runs from one shelter to another. Unlike its congeners it does not bury itself in sand, but escapes into burrows made in the roots of bushes and under boulders. When cornered, it takes an offensive stance by raising its body and attacking with open mouth and lashing tail.

*Range*:
Ranges in desert basins of Iran, Afghanistan, and Balochistan.

### ***23. Trapelus agilis* (Oliver)**
### **(Fig.6.22)**

1. Head with heterogeneous, convex, smooth or keeled scales, largest at the snout.
2. Short spines on occiput and tympanic region.
3. Supralabials 15-18, their free margins form denticulated upper lip.
4. Tympanum deeply sunk, smaller than eye.
5. Dorsum with uniform rhomboidal, imbricate, keeled, often mucronate scales, spines of the median rows point straight backward and downward.
6. Ventrals are as large as laterals, smooth or feebly keeled.
7. Male with short gular sac and has 1-3 rows of callose preanal scales.

   Snout-vent length 90-108 mm, tail 150-164 mm.

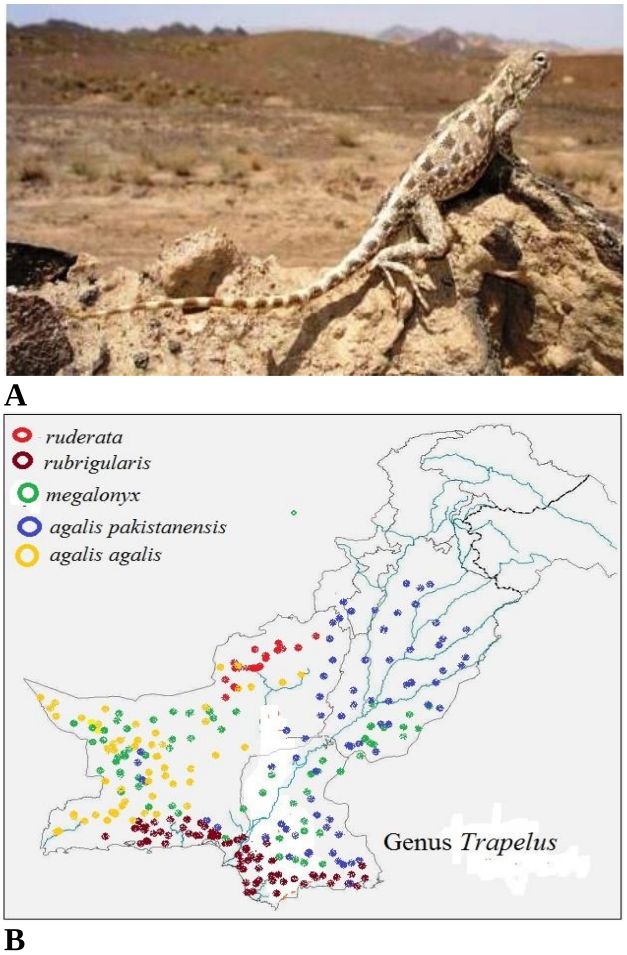


**Fig.6.22.** *Trapelus agilis* **(**Oliver**).** B shows distribution of different species of Genus *Trapelus* in different parts of Pakistan.

*Colour*:
*Trapelus agilis* displays rapid metachromatic changes. Usually the male is brown, gray, or dull yellow with dark crossbands on body and light spots on flanks, which may change to more or less completely suffused with bright cobalt blue; tail bright yellow with dark brown bands; throat, chest, and belly normally whitish, streaked with gray and lavender, may change to deep ultramarine blue.

*Habitat*:
A typical open desert species, with clay, gravel and moderately sandy soil. Vegetation comprises of scattered shrubs or mounds with grass and herbs, or it is dry grassland with marginal thorny bushes.

*Range*:
From western Iran through Afghanistan and Central Asia (to southern Kazakhstan), Pakistan and Rajasthan, India.

*Two races:*
**1a**. Tail almost always round, two (or more) rows of callose preanal scales; 65-91 scales around body; dorsal scales subequal, weakly to moderately keeled, often strongly mucronate; ventral scales smooth or weakly keeled. ............................ *Trapelus agilis agilis*

*Range*:
Central Iranian Plateau, central and southern Afghanistan, southwestern Pakistan.
**1b**. Tail often compressed, one row of callose preanal scales, in case of two, the second undeveloped (preanals absent or weakly developed in females). Dorsal scales subequal to homogeneous, distinctly keeled, mucronate, usually clearly set off from small dorsolaterals; 67-83 scales around body; ventrals distinctly keeled in adult males; background coloration often ................................................................... sandy-grey............ *Trapelus agilis pakistanensis*

*Range***:**
Southeastern Pakistan and adjoining northwestern India.

### *24. Trapelus megalonyx* Günther
(**Figs.6.23 & 6.22B**)

1. Dorsals heterogeneous, larger are arranged in groups, some scales smooth, other feebly or strongly keeled or mucronate, strongly imbricate and less rhomboidal.
2. Ventrals as large as small dorsals, feebly keeled.
   Snout-vent length 65-67 mm, tail 70-75 mm.

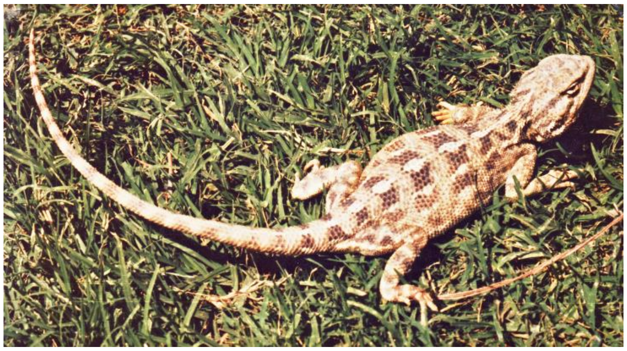


**Fig.6.23.** *Trapelus megalonyx* Günther.

*Colour*:
Dorsum metallic bronze in male, with a vertebral series of 6 large light dark-edged crossbars, enclosing a reddish ocellus. Throat cobalt blue, a dark streak along nape. Ventrum whitish with light mottling. Female pale gray to brown, with dorsal row of cross-bands enclosing dull orange ocelli edged with black. Throat and ventrum white.

*Habitat*:
Inhabits deserts with alluvial soil and little vegetation of grass and shrubs. Its burrows are located in the roots of shrubs and low thorny bushes. Diurnal, it becomes active 3-4 hours after dawn, feeding on insects and vegetation.
Reproductive activity is observed from March to May; 4-6 eggs are laid in burrows or under rock. Juveniles are seen from April to August.

*Range*:
It extends from to southern Afghanistan, Iran, Balochistan, the Sindh and Cholistan Desert in Punjab, Pakistan. It is collected up to an elevation of 1800 m.

### *25. Trapelus rubrigularis* Blanford
(**Figs. 6.24 & 6.22 B**)

1. Head scales unequal, keeled or granular, largest on snout. No spine on occiput.
2. Supralabials 16 to 18, forming denticulate upper lip.

3. Dorsals rhomboidal, imbricate, subequal, feebly keeled, scales intermixed with large, strongly keeled scales, arranged in more or less regular transverse rows.
4. Gular and ventral scales smooth, as large as the small dorsals. Gular sac slightly indicated in male.
5. Limbs weak, hind limb reaching occiput or ear.
6. Tail oval, covered with blunt tipped, subequal keeled scales.
7. Male with 1 or 2 rows of callose preanal scales.

   Snout-vent length 82-89 mm, tail 98-105 mm.

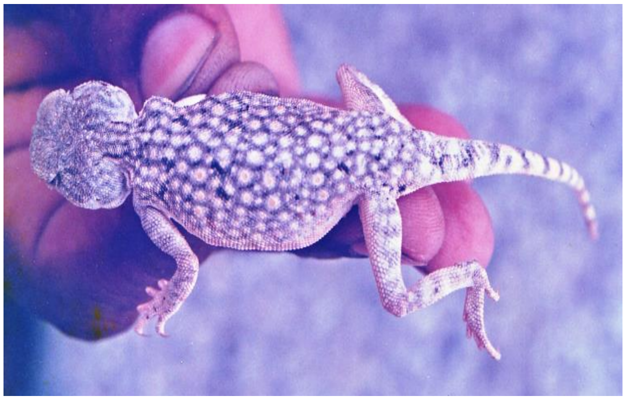


**Fig.6.24.** *Trapelus rubrigularis* Blanford.

*Colour*:
Dorsum olive or grayish, with small golden yellow spots at the center of each enlarged dorsal scale; juveniles with 3-4 dorsal series of black spots, persisting in some individuals throughout life. A dark streak from nape, ventrum whitish. In life, a large red spot on throat in both sexes.

*Habitat*:
The red-throat ground agama has been collected from flat desert with sparse grass and occasional thorny shrubs. When encountered in the open, it flattens its body, then sprints toward its burrow which lies at the roots of thorny bushes. Breeding season is quite extended from April to August, 4-6 eggs are laid in burrows. It is insectivorous and diurnal (Minton 1966).

*Range*:
The red-throat agama has been recorded from lower Sindh and coastal Balochistan.

### ***26. Trapelus ruderatus baluchianus*** (Smith)
**(Figs. 6.25 & 6.22B)**

1. Head with heterogeneous convex keeled scales; those at the back of the head spinose.
2. Supralabials 19, orally dentate.

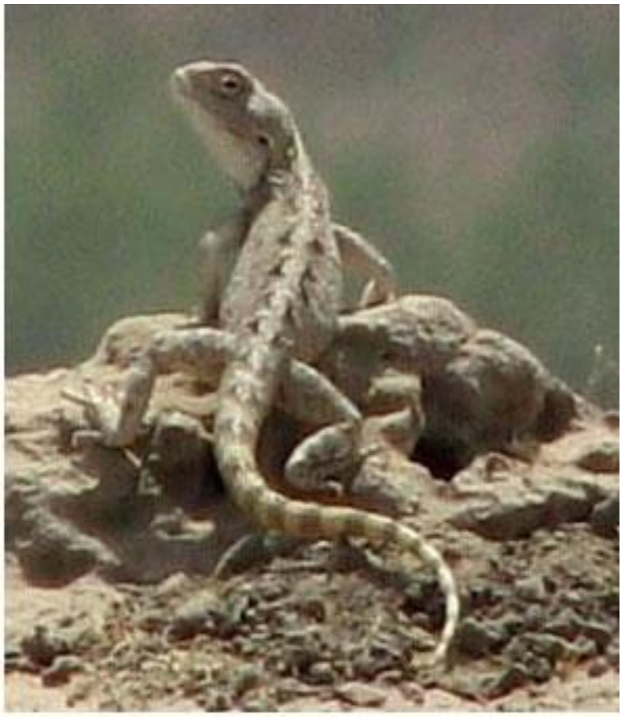


**Fig.6.25.** *Trapelus ruderatus baluchianus* (Smith).

3. Dorsals heterogeneous, rhomboidal, imbricate, with numerous large strongly keeled scales which are irregularly arranged, sometimes partially erect, all pointing more or less backward.
4. Flanks with backward and downward-directed small pointed scales.

5. Ventrals as large as laterals, smooth or feebly keeled.
6. Gulars as large as ventrals, no gular sac.
7. Hind limb reaches neck.
8. No strongly differentiated scales on neck and hind limb.
9. Tail round in transverse section, with subequal strongly keeled scales.
   Snout-vent length 75-80 mm, tail 100-106 mm.

*Colour*:
Dorsum grayish brown, ventrum pale, an indistinct dorsolateral series of paired dark brown spots.

*Habitat*:
This ground agama has been collected from semiarid rocky highland at elevations of 1800-2000 m. It is shy and sluggish, and lives in dense clumps of thorny vegetation, or under rocks. Breeding season extends from March to June; 6-10 eggs are laid. It is carnivorous, feeding on arthropods (Minton 1966).

*Range*:
The spotted ground agama has been recorded from Quetta and Sibi Districts in Pakistan.

### Family Chamaeleonidae

***Chamaeleo***
Head compressed, with an elevated median casque, with small, irregularly arranged scales; digits fused in two bundles. Single species.

### 1. ***Chamaeleo zeylanicus*** Laurenti
**(Fig.6.26)**

1. Head and body laterally compressed.
2. Prominent orbital and occipital ridges fusing posteriorly to form a casque.
5. Tail coiled ventrally.
6. Eyes protuberant, capable of independent movement.
   Snout-vent length 218-235 mm, tail 241-265 mm.

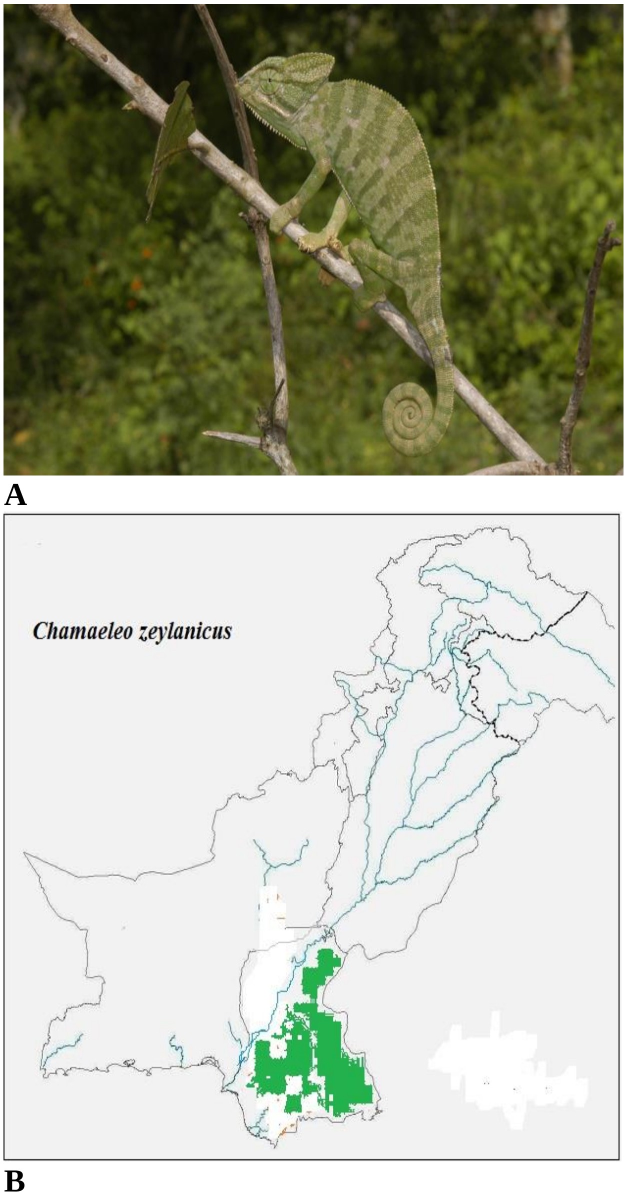


**Fig.6.26.** *Chamaeleo zeylanicus* Laurenti.

*Colour*:
Colour variable due to metachromatic changes. Usually dorsum pale yellow to dark olive, indistinct white or yellowish spots on sides, ventrum yellowish to greenish white, upper labials and enlarged midventrals ivory.

*Habitat*:
Inhabits thick jungles, bushy country, with mesic to moderate xerophytic environments. It is diurnal and completely arboreal, very clumsy on the ground. Branches are held firmly between clasping digits of hands and feet; the prehensile tail also helps in movements by holding on to the branches.

*Range*:
Wooded parts of peninsular India and Sri Lanka, extends into southeastern Sindh in Pakistan, where it is rare and local, does not extend beyond Sindh.

# APPENDIX

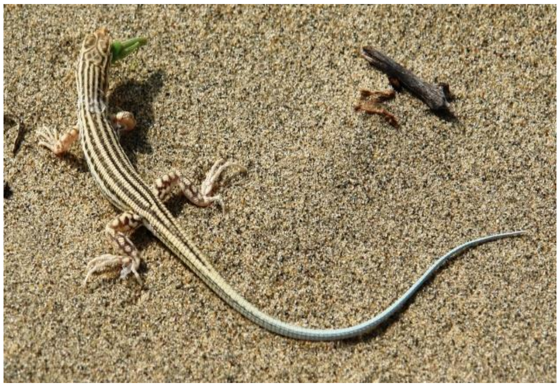
## Scientific, common English and Urdu names

| **Family Agamidae** | **Agama** | ***Kirlay*** | کرّلے |
|---|---|---|---|
| *Brachysaura minor* (Hardwicke and Gray, 1827) | Short-tail Agama: | *Choti-dum kirla* | چھوٹی دُم کرلا |
| *Calotes versicolor versicolor* (Daudin, 1802) | Garden Lizard: | *Girgit* | گرگٹ |
| *Calotes versicolor farooqi* Auffenberg & Rehman, 1995 | Alpine Garden Lizard: | *pahari girgit* | پہاڑی گرگٹ |
| *Japalura kumaonensis* (Annandale, 1907) | Kumano Agama: | *Kumaon Krail* | کماؤن کرایل |
| *Laudakia agrorensis* (Stoliczka, 1872) | Agrore Valley Agama: | *Agror Wadi Kirla* | اگرور ویلی کرلا |
| *Laudakia badakhshana* (Anderson & Leviton, 1969) | Badkshan Agama | *Badkshani Kirla* | بدخشانی کرلا |
| *Laudakia caucasia* (Eichwald, 1831) | Caucasian Agama | *Koh-qaafi Kirla* | کوہ قافی کرلا |
| *Laudakia fusca* (Blanford, 1876) | Yellow-head Agama | *Zarad-sar kirla* | زرد سر کرلا |
| *Laudakia himalayana* (Steindachner, 1869) | Himalayan Agama: | *Himalayai Kirla* | ہمالائی کرلا |
| *Laudakia lirata* (Blanford, 1874) | Yellow Agama: | *Zarad Kirla* | زرد کرلا |
| *Laudakia melanura nasiri* Baig, 1999 | Spotted Agama | *Chittra Kirla* | چترا کرلا |
| *Laudakia melanura melanura* Blyth, 1854 | Black Agama | *Siah Kirla* | سیاہ کرلا |
| *Laudakia microlepis* (Blanford, 1874) | Small-scale Rock Agama | *chootay chanay wala Kirla* | چھوٹے چانے والا کرلا |
| *Laudakia nupta* (de Filippi, 1843) | Spiny Agama | *Khaar-sar Kirla* | خار سر کرلا |
| *Laudakia nuristanica* (Anderson & Leviton, 1969) | Nuristan Agama | *Nuristani Kirla* | نورستانی کرلا |
| *Laudakia pakistanica* (Baig, 1989) | North-Pakistan Agama | *Uttri-Pakistan Kirla* | اتری پاکستانی کرلا |
| *Laudakia pakistanica auffenbergi* Baig & Böhme, 1996 | Besham Agama | *Besham Kirla* | بشام کرلا |
| *Laudakia pakistanica khani* Baig and Böhme, 1996 | Chilas Agama | *Chilas Kirla* | چلاشی کرلا |
| *Laudakia tuberculata* (Hardwicke and Gray, 1827) | Blue Agama | *Neela Kirla* | نیلا کرلا |
| **Family Chamaeleonidae** | Chameleon | *Tajsar* | تاج سر گرگٹ |
| *Chamaeleo zeylanicus* Laurenti, 1768 | Ceylonese Chameleon: | *Taj-sar Girgit* | سیلونی تاج سر گرگٹ |

# Chapter 7

## Lacertidae

Family Lacertidae ...............................................
Description of Species .......................................



*Acantodactylus blanfordii*

### Family Lacertidae

There are four genera of this family in Pakistan

1. Genus ***Acanthodactylus*** Wiegmann, 1834
   Occipital scale absent; nostrils between two nasals and first supralabial; lower eyelid scaly; collar distinct; dorsal scales small juxtaposed or large imbricate; ventrals subquadrangular, smooth, imbricate; digits subcylindrical, with keeled subdigital lamellae, lateral denticulations, at least on the outer side of toes; femoral pores present.
   Three acanthodactylid lizards are reported from Pakistan.

1. **Genus *Eremias*** Wiegmann, 1834
   Occipital scale vestigial or absent; nostril between 3-4 nasals, not touching supralabials; collar complete or nearly so; dorsal scales granular, subimbricate or juxtaposed; abdominal scales subquadrangular, imbricate, smooth in oblique converging longitudinal rows; digits with or without fringe of lateral scales; usually femoral pores present.
   Five species of eremiid lizards are reported from Pakistan.

2. **Genus *Mesalina*** Gray, 1838
   Occipital shield usually present; lower nasal scale in contact with first supralabial only; nostril between 3 nasals and is widely separated from supralabials; sometimes two or more transparent bodies in lower

eyelid; abdominal scales in parallel longitudinal rows.

Two species recorded from Pakistan

3. **Genus *Ophisops*** Ménétriés, 1832

Lower eyelid fused with upper, with a large transparent disc, covering the eye; collar weakly defined or absent in the middle; subdigital lamellae keeled; dorsal scales rhomboidal, imbricate, strongly keeled; femoral pores present.

Two species reported from Pakistan.

**Key:**

l. Naris in contact with first supralabial........2
Naris not in contact with first supralabial .....4
2. Dorsals scarcely larger than laterals; usually 7 light stripes on body; tail tip yellow ........... *Acanthodactylus micropholis*
Dorsals much larger than laterals; usually 6 stripes on dorsum; tail tip blue, gray, or pink ...........................................................3
3. Median dorsals and laterals are of almost equal size; middorsals 40-46 across midbody; gulars 18-20................................. *Acanthodactylus blanfordii*
Median dorsals distinctly larger than laterals, 26-36; gulars 26 to 36 .................... *Acanthodactylus cantoris*
4. Eyelids immovable, forming spectacle; dorsals pointed, imbricate, and keeled; no collar ..........................................................5
Eyelids movable, lower with transparent disc; dorsals granular, subimbricate or juxtaposed; collar present ........................6
5. Head scales rugose; 25 to 35 scales aroundz ........................... *Ophisops jerdonii*
Head scales smooth; 31-38 scales around the midbody .....................*Ophisops elegans*
6. Ventrals in straight longitudinal rows; an occipital scale present ...............................7
Ventrals in oblique longitudinal rows; occipital scale absent ................................8
7. Occipital scale in contact with interparietals; transparent scale in lower eyelid, edged with black.............................. ............................ *Mesalina watsonana*
Occipital scale not in contact with interparietals; transparent scale in lower eyelid not edged with black......................... ............................*Mesalina brevirostris*
8. Fringe of pointed scales distinct on the fourth toe ....................................................9
Fringe on the fourth toe absent.................11
9. Fringe is only on the outer side of fourth toe.. .................................... *Eremias scripta*
Fringe is on both sides of the fourth toe .........................................................10
10. Femoral pores present.....*Eremias acutirostris*
Femoral pores absent.....*Eremias aporosceles*
11. Dorsals 55 or more at .................................. midbody ............................*Eremias persica*
Dorsals 50 or fewer at midbody .................. ...................................*Eremias fasciata*

### *1. Acanthodactylus blanfordii* Boulenger (**Fig.7.1**)

1. Lateral body scales a little smaller than those of middorsum.
2. Scales at midbody 28-46, gulars 32-38.
3. Hind limb reaches to ear or eye.
4. Femoral pores 21-29.

Snout-vent length 70-73 mm, tail 172-175 mm.

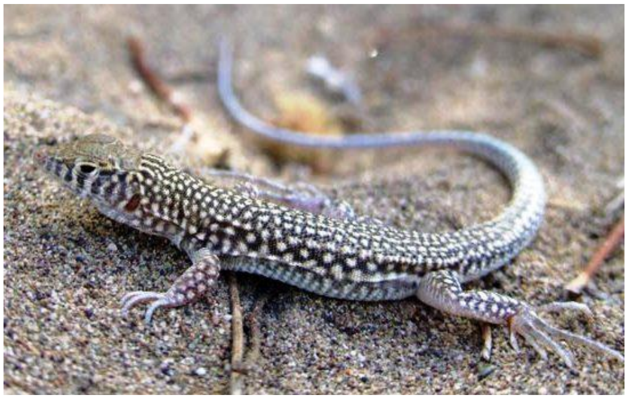


**Fig.7.1.** *Acanthodactylus blanfordii* Boulenger.

*Colour:*

Dorsum reddish brown to gray, speckled with white, traces of longitudinal stripes present; tail reddish gray. Ventrum white. Juveniles with 6 longitudinal yellow stripes on dark dorsum, extending onto the tail, tail distally pinkish.

*Habitat*:

The lizard frequents sand dunes, beaches, dry beds of water courses with sparse vegetation. It is diurnal, it keeping to the shade of vegetation at midday. In the afternoon, the lizard has a second brief spell of daily activity; however, at sunset it retreats into its burrow at the root of vegetation. It feeds on arthropods and their larvae. To escape capture, it runs from bush to bush instead of retreating into a burrow or under cover. It feeds on different kind of arthropods. The prey is quickly seized and, if of a larger size, is shaken and battered against the ground before taking in (Minton 1966).

It breeds from March to May and fights among breeding males are frequent; 2-6 eggs are laid in burrows and young are active by late April to July.

*Range:*

*Acanthodactylus blanfordii* is recorded from the western Balochistan and along the Makran coast, extending into southern Afghanistan.

### 2. *Acanthodactylus cantoris* Günther
(**Fig.7.2**)

1. Dorsals 26-36 across midbelly, gulars 26-38.
2. Hind limb reaches between ear and collar in male, between collar and axilla in female.
3. Femoral pores 16-23.
4. Subocular does not border mouth, separated from it by fifth and sixth supralabial.

   Snout-vent length 75-78 mm, tail 180-188 mm.

*Colour*:

Dorsum reddish brown to gray, speckled with white, often with traces of longitudinal stripes; tail bluish gray. Ventrum white. Young with 6 longitudinal yellow stripes on dark dorsum, extending onto tail, distal part of the tail blue.

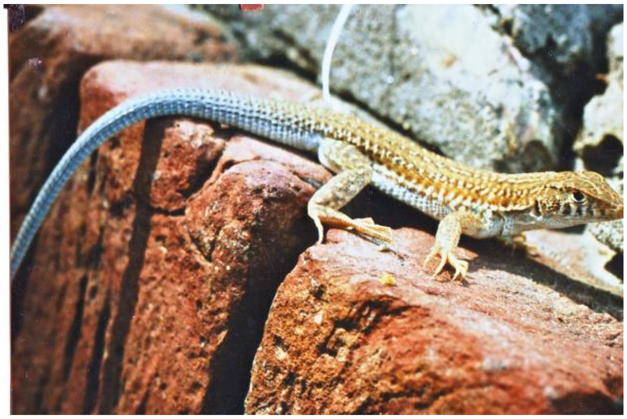


**Fig.7.2.** *Acanthodactylus cantoris* Günther.

*Habitat*:

Frequents sand fields with sparse vegetation of bushes and grasses. It burrows in roots of bushes where the sand is compact.

*Range:*

Wide ranging Saharo-Sindhian species from Saudi Arabia, Iraq, southern Afghanistan, and Iran, throughout the plains and deserts of Pakistan and India, from sea level to an elevation of 300 m. It is a common lizard along the beaches of Pakistani coastal areas.

### 3. *Acanthodactylus micropholis* Blanford
(**Fig.7.3**)

1. Lower eyelid scaly.
2. Dorsals in 43-54 rows, less than twice the size of the laterals.
3. Ventrals in 9-10 straight rows.
3. Gular scales 30-32 in a median row.
4. Femoral pores 40-43.

   Snout-vent length 62-65 mm, tail 125-130 mm.

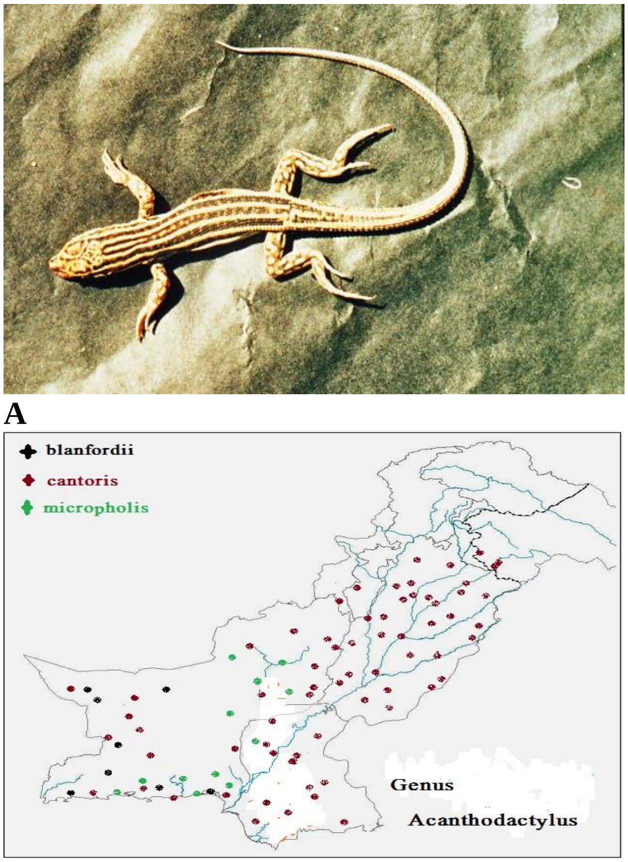


**Fig.7.3.** *Acanthodactylus micropholis* Blanford. B shows distribution of species of genes *Acanthodactylus* in different part s of Pakistan.

*Colour*:
Adult with seven bright yellow stripes separated by black or dark brown interstripe zones, lateral stripes are spotted with light; limbs grayish brown, spotted with yellow; tail bright yellow, ventrum white. Young similar to adult, but lack lateral spots on body.

*Habitat*:
Inhabits sandy places, stream beds with stones and sand.

*Range:*
From southeastern Iran along coastal Makran, Las Bela; northward it extends to central Balochistan.

### ***4. Eremias acutirostris*** (Boulenger)
(**Fig.7.4**)

1. Dorsals granular, not enlarged on flanks.
2. Ventrals in 18-22, oblique longitudinal and 34-38 transverse rows.
3. Both fingers and toes with a well-developed fringe of flat pointed scales.
3. An occipital scale absent.
4. Femoral pores 22-30.
5. The subocular does not border the mouth.
   Snout-vent length 68-70 mm, tail 148-150 mm.

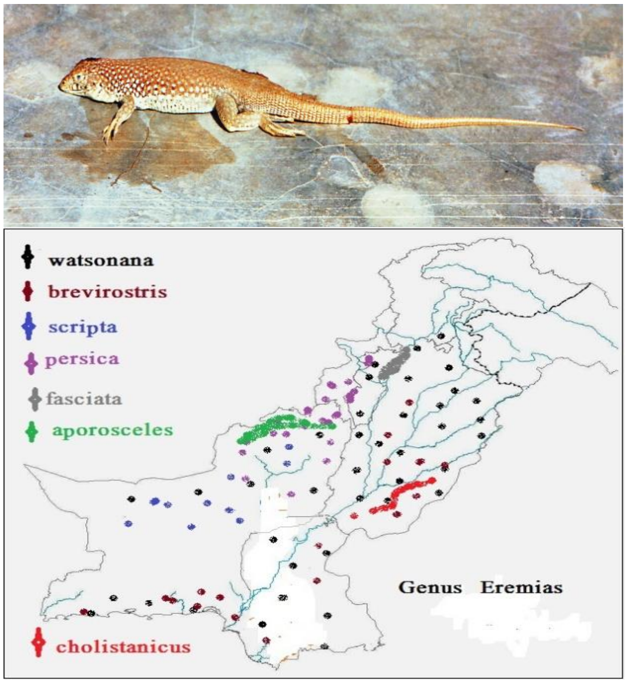


**Fig.7.4.** *Eremias acutirostris* (Boulenger). B shows distribution of all species of Genus *Eremias* in different parts of Pakistan.

*Colour*:
Dorsum light brown, with a fine reddish brown reticulum extending onto limbs, enclosing pale grayish spots. Ventrum pale yellow to white.

*Habitat*:
This desert lacerta is very agile on loose fine

sand dunes. When followed, it escapes by burrowing and tunnelling through the sand.

*Range:*
From desert basins of northwestern Balochistan and adjoining Afghanistan and Iran.

### 5. *Eremias aporosceles* (Alcock and Finn)
(**Fig.7.4B**)

1. Femoral pores absent.
2. Fringe of pointed scales on both sides of fourth toe.
3. Gular scales 28-33.
4. Dorsals granular, subequal, 68-82 across mid-dorsum.
5. Ventrals in 18-20 longitudinal, and 34-36 transverse series.
   Snout-vent length 78-80 mm, tail 135-140 mm.

*Colour*:
Dorsum sandy gray, with dark reticulation, head with symmetrical dark markings. Ventrum white.

*Habitat*:
Frequents sand fields with sparse marginal vegetation, also extending into sandy rocky country.

*Range:*
Recorded from around Koh Malik-do-Khand, at the Afghanistan-Pakistan border.

### 6. *Eremias cholistanicus* Baig & Masroor
**(Figs.7.5 & 7.4B)**

1. Dorsal at midbody 51-63.
2. Ventrals across midabdomen 13-15.
3. Subocular in mouth.
4. A row of granules separate supraciliaries from supraoculars. Occipital absent.
5. 14-18 femoral pores, separated by 2-4 scales.

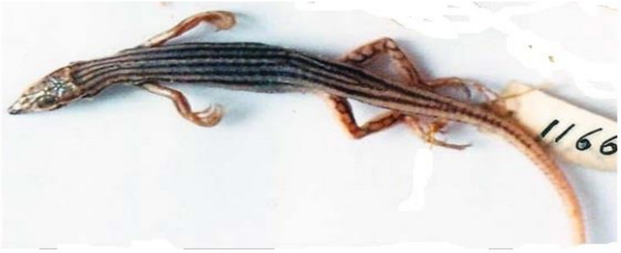


**Fig.7.5.** *Eremias cholistanicus* Baig & Masroor.

*Colour*:
Dorsum light with 6-7 dark stripes running to tail dorsum.

*Range:*
Bahawalpur, southern Punjab, Pakistan.

### 7. *Eremias fasciata* Blanford
(**Figs.7.6 & 7.4B**)

1. Ventrals in oblique longitudinal rows.
2. No fringe of scales on fourth toe.
3. No occipital scale.
4. Number of dorsal scale rows at midbody 44-50.
5. Caudal scales strongly keeled.
6. Femoral pores 15-18.
   Snout-vent length 63-65 mm, tail 120-124 mm.

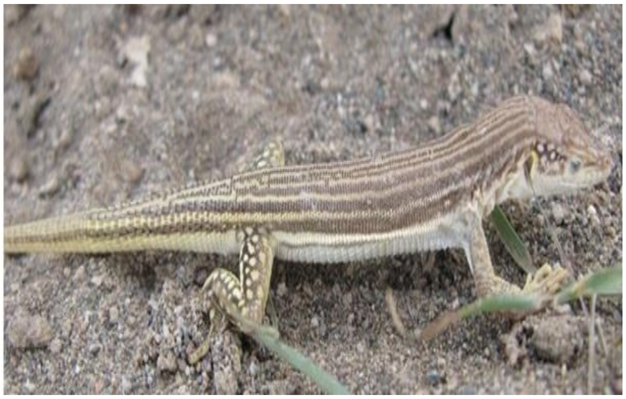


**Fig.7.6.** *Eremias fasciata* Blanford.

*Colour*:
Dorsum pale gray to sandy, with 5-9 narrow dark, longitudinal streaks on neck, reduced to 5-

7 on back. A lateral stripe from eye to supraocular region, another along outer margin of the ventrals. Ventrum white.

*Habitat*:

The lizard inhabits sandy plains with bushes. Diurnal, it feeds on various types of desert arthropods.

*Range:*

It ranges from Iran, Afghanistan, and Balochistan up to southern Waziristan, Dera Ismael Khan.

### ***8. Eremias persica*** (Blanford)

(**Figs.7.7 & 7.4B**)

Largest and most robust of all Pakistani lacertids.

1. Interparietal is longer than the suture between parietals.
2. No fringe of scales along outer border of fourth toe.
3. Large supraoculars 2.
4. Caudals keeled, arranged in annuli.
   Snout-vent length 95-98 mm, tail 150-152 mm.

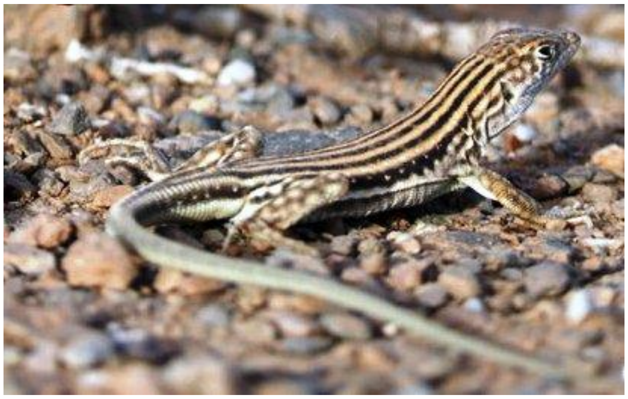


**Fig.7.7.** *Eremias persica* (Blanford).

*Colour*:

Adult with grayish brown dorsum, a wide irregular black or dark brown stripe from shoulder to the base of tail. Additional pale gray, or white and dark markings and spots are arranged in longitudinal rows. Limbs with indistinct light spots. Distal half of tail bluish.

*Habitat*:

Inhabits scrubby and sparse grassland habitat with sandy substratum, clearly avoiding open sand dunes. Running at great speed from one clump of bushes to another is the characteristic behavior of this lizard.

*Range:*

Confined to the northern Iran. In Pakistan it is reported from northern Waziristan, Quetta, and Nushki.

### ***9. Eremias scripta*** (Strauch)

(**Figs.7.8 & 7.4B**)

1. Fringe of large scales only on outer border of fourth toe.
2. Ventrals in 14-16 oblique longitudinal and 32-34 transverse series.
3. An occipital scale present.
   Snout-vent length 58-60 mm, tail 128-130 mm.

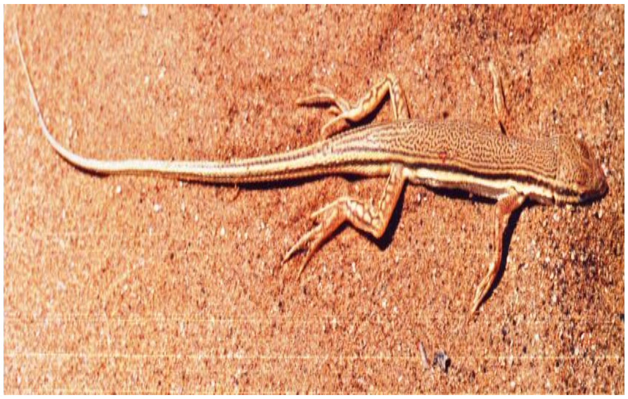


**Fig.7.8.** *Eremias scripta* (Strauch).

*Colour*.

Dorsum yellowish to golden brown, becomes pale bluish gray on tail, with 5-7 fine dark stripes, some of which are vermiculate. Sides and ventrum of the body cream to white.

*Habitat*:

The vermiculated lacerta inhabits flat fields of loose fine sand, with sparse vegetation of small herbs and grasses. The lizard is very active during the early and late hours of the day.

*Range:*

The vermiculate lacerta extends from Transcaspia to eastern Khazakistan, Iran, Afghanistan and northern Balochistan, to east of Nushki.

### *10. Mesalina brevirostris* Blanford

(**Fig.7.9**)

1. Occipital separated from the interparietals.
2. Ventrals in 10-12 straight longitudinal series, median 4 rows distinctly broader than long.

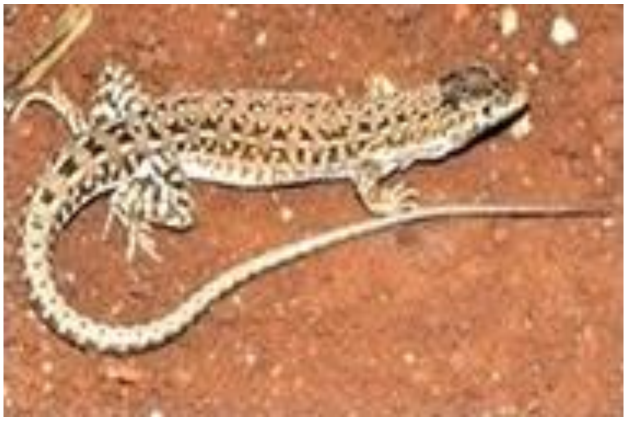


**Fig.7.9.** *Mesalina brevirostris* Blanford.

3. Lower nasal scale rests on first supralabial only.
4. An occipital scale present.
5. No fringe of scales on digits.
   Snout-vent length 56-58 mm, tail 95-98 mm.

*Colour*:

Grayish brown dorsum with numerous white and black spots which are largest and more closely arranged on sides.

*Habitat*:

Hard alluvial soil close to sand dunes, where vegetation is sparse in the form of clumps of thorny bushes and reeds. The lizard moves quickly from one clump to another.

*Range*: Reported from District Mianwali, in northwestern Punjab, and coastal Las Bela. It has extensive Range in the west to Syria.

### *11. Mesalina watsonana* (Stoliczka)

(**Fig.7.10**)

1. Ventrals distinctly broader than long, in 8-10 straight longitudinal series across midabdomen.
2. Occipital scale in contact with the interparietal.
3. Lower nasal scale rests only on first supralabial.
4. No lateral fringe on fourth toe.
5. Dorsal and lateral scales of body granular.
   Snout-vent length 60 mm, tail 124 mm.

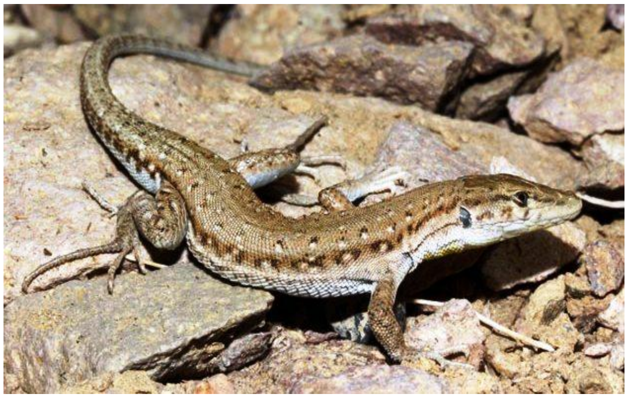


**Fig.7.10.** *Mesalina watsonana* (Stoliczka).

*Colour*:

Grayish to olivaceus dorsum, usually 2 pairs of indistinct light longitudinal stripes. Middorsum with longitudinal series of small white spots which are edged with black. Limbs with faint light spots. Ventrum white to yellowish.

*Habitat*:
Prefers flat fields of hard soil, where the vegetation of herbs and grasses is sparse. It particularly avoids soft loose sandy soil.

*Range*: From Rajputana to southern Afghanistan, and Iran. In Pakistan it occurs throughout the plains, excluding the deserts. It extends from sea level to 2000 m of elevation.

### *12. Ophisops elegans* Ménétriés
(**Fig.7.11**)

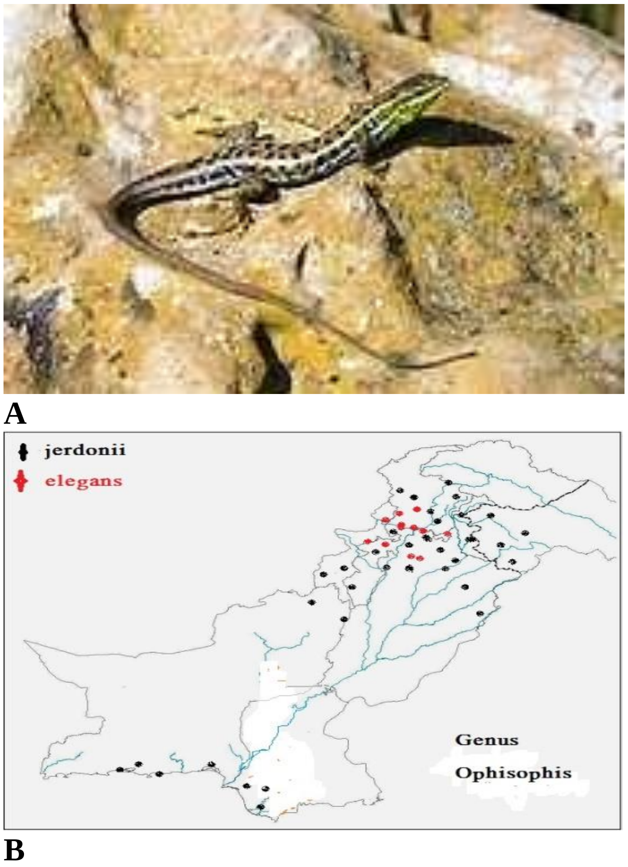


**Fig.7.11.** *Ophisops elegans* Ménétriés. B shows distribution of species of Genus *Ophisops* in different parts of Pakistan.

1. Head scales smooth.
2. Scales around midbody 31-38 scales.
3. Femoral pores 10-12 on each side.
Snout-vent length 55-58 mm, tail 102-107 mm.

*Colour*:
Olive greenish or brownish dorsum, with a pair of light dorsolateral stripes; first originating from the supraciliary margin; second from below eye, passing through ear, along body flanks to hind limb. Upper stripe dorsally spotted with black. A series of vertebral spots. Ventrum greenish white.

*Habitat*:
Gullied scrubland, with sparse vegetation of low grasses, reeds, and thorny bushes. The lizard lives in crevices and holes in soil and moves very fast from one shelter to another.

*Range*:
Reported from Mianwali District and Waziristan hilly tracts. However, it has wider Range in the west, extending to the Caspian region and west to Turkey and the Levant.

### *13. Ophisops jerdonii* Blyth
(**Fig.7.12**)

1. Head scales rugose, with strong striations.
2. Scales around mid body 28-35 scales.
3. Femoral pores 7-12, on each side.
Snout-vent length 47-49 mm, tail 95-98 mm.

*Colour*:
Olive brown, golden or greyish above, with a pair of golden lateral streaks, upper one extending from supracilliaries to tail, lower bordering upper lip and extending along body flanks to the base of the hind limb. The space between stripes, as well as the upper border of the upper stripe, usually spotted with black. Ventrum yellowish brown.

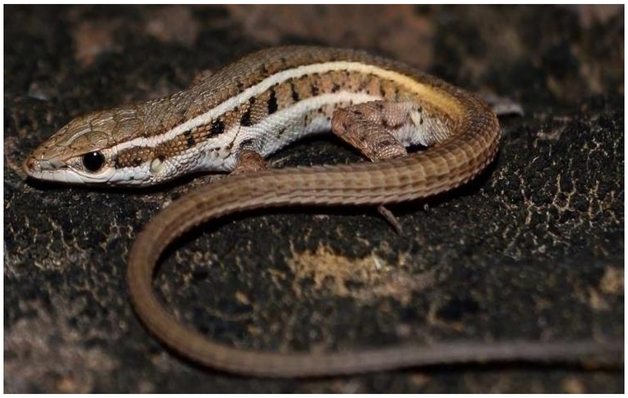


**Fig.7.12.** *Ophisops jerdonii* Blyth.

*Habitat*:
It is common in the leaf litter, and inhabits moist environs of shady places in gardens, forests, grasslands, and the areas with much ground cover.

*Range*:
Widely distributed lizard in the plains and semi-hilly regions throughout Pakistan and India. In Pakistan it has been recorded apart from various localities in the Punjab and Sindh plains, from alpine Punjab, Salt Range, Waziristan, Quetta, and Khuzdar in Balochistan.

# APPENDIX

## Scientific, common English and Urdu names

| | | | |
|---|---|---|---|
| Family LACERTIDAE | Sand lizards | *Taiz-rao, ChalpayAy* | تیزرو، چلپائے |
| *Acanthodactylus blanfordii* Boulenger, 1918 | Red-tail Sand Lizard | *Surakh-dum Taiz-rao* | سرخ دم تیزرو |
| *Acanthodactylus cantoris* Günther, 1864 | Blue-tail Sand Lizard | *Neeli-dum Taiz-rao* | نیلی دُم تیزرو |
| *Acanthodactylus micropholis* Blanford, 1874 | Yellow-tail Sand Lizard | *Peeli-dum Taiz-rao* | زرد دم تیزرو |
| *Eremias acutirostris* (Boulenger, 1887) | Lesser Reticulate Sand Lizard | *Patti-dar Taiz-rao* | پٹی دار تیزرو |
| *Eremias aporosceles* (Alcock & Finn, 1896) | Greater Reticulate Sand Lizard | *Jal-dar Taiz-rao* | جالدار تیزرو |
| *Eremias fasciata* Blanford, 1874 | Striped Sand Lizard: | *Patti-dar Taiz-rao* | دھاری دار تیزرو |
| *Eremias persica* Blanford, 1874 | Persian Sand Lizard | *Irani Taiz-rao* | ایرانی تیزرو |
| *Eremias scripta* (Strauch, 1867) | Vermiculate Sand Lizard | *Noushki Taiz-rao* | نوشکی تیزرو |
| *Mesalina brevirostris* Blanford, 1874 | Short-snout Sand Lizard | *kota-sar Taiz-rao* | کوتہ سر تیزرو |
| *Mesalina watsonana* (Stoliczka, 1872) | Spotted Sand Lizard | *Chittra Taiz-rao* | چترا تیزرو |
| *Ophisops elegans* Ménétriés, 1832 | Smooth Spectacled Sand Lizard | *Naram samp-chishm Taiz-rao* | نرم سانپ چشم تیزرو |
| *Ophisops jerdonii* Blyth, 1853 | Rugose spectacled sand lizard | *Khurdra samp-chishma Taiz-rao* | کھردری سانپ چشم تیزرو |

# Chapter-8

## Scinidae

Family Scinidae ..................................................

*A Scincid*

### Family Scinidae

There were eight genera of this family in Pakistan

1. **Genus *Ablepharus*** Fitzinger, 1823
   No supra-anal shields; eyelids fused with each other forming transparent spectacle covering the eye; ear opening reduced in size or absent. Limbs pentadactyl, weakly developed; body with smooth cycloid scales, in 18-26 rows around midbody,
   Two species known from Pakistan.

2. **Genus Chalcides** Laurenti, 1768
   Nostril between nasal and rostral; supranasals present; prefrontals and frontoparietals absent; lower eyelid with a transparent disc; body elongate, cylindrical; limbs reduced or vestigial.
   Single species known from Pakistan.

3. **Genus *Eurylepis*** Blyth, 1854
   Limbs relatively slender, lamellae not expanded. Head somewhat conical. Head scales shiny, separated by shallow sutures. Two loreals, followed by two presuboculars. Postnasal scales present. Palbebral scales and superciliaries not separated by groove. Four or five pairs of nuchal scales, followed by several pairs of broadened mid-dorsal scales and broad row

of fused mid-dorsal scales. Large median preanal scales overlie small lateral pair. Ear lobules conspicuous, but not covering ear opening. Color pattern consists of gray-brown background, with pale, broad dorsolateral stripes, more distinct anteriorly, brown rectangular spots dominating posteriorly."

A single species known from Pakistan.

4. **Genus *Lygosoma*** Hardwick & Gray, 1827

Naris piercing nasal scale; supranasal scale present; dorsals uniform in size; body and tail elongated; limbs short vestigial, pentadactyl, clawed.

A single species represented in Pakistan.

5. **Genus *Eutrophis*** Fitzinger, 1843

Eyelids moveable, lower with or without a transparent disc; ear opening distinct, tympanum deeply sunk; nostrils piercing single nasal scale; supranasals and prefrontals shields are present. Limbs well developed, pentadactyl, digits subcylindrical or compressed with transverse subdigital lamellae.

Two species are reported from Pakistan.

6. **Genus *Novoeumeces*** Griffith, Ngo, and Murphy, 2000)

Relatively heavy limbs with robust pes, expanded subdigital lamellae. Head scales thick, separated by deep sutures. Two loreals, followed by two presuboculars. Postnasal absent. Palbebral scales separated from superciliary scales by deep groove containing small granular scales. Three or four pairs of nuchal scales. Ear lobules conspicuous, but ear opening not fully covered. Two mid-dorsal scale rows broadened, not fused. Medial preanal scales overlie lateral preanal scales, Color pattern usually consisting of small spots, broken longitudinal stripes or irregular narrow bars on brown or olive background.

Three species are recorded from Pakistan.

7. **Genus *Ophiomorus*** Duméril and Bibron, 1839

Eyes small; eyelids reduced, lower eyelid with a transparent disc; ear opening absent or hidden; naris in a suture between nasal and supranasal, close to rostral; prefrontals, frontoparietal and parietal are distinct; body elongate, serpentine, with weak limbs and reduced digits, limbs may be absent.

Four species are reported from Pakistan.

8. **Genus *Scincella*** Mittleman, 1950

Body rather short, not markedly serpentine; eyelids moveable; a supranasal scale absent; limbs more or less strong, pentadactyl, clawed.

Two species known from Pakistan.

## Family Scincidae

**Key:**

1. Body serpentine; limbs short and vestigial .....................................................2
   Body not markedly serpentine; limbs well developed ..................................................5
2. Fingers 4; toes 3 ........................................3
   Fingers and toes 3 ......................................4
3. Scale rows at midbody 20 ............................ ...........................*Ophiomorus blanfordi*
   Scale rows at midbody 22. ........................... ........................... *Ophiomorus brevipes*
4. Parietals in contact with anterior temporal .........................*Ophiomorus tridactylus*
   Parietal and anterior temporal separated by posterior temporal .....*Ophiomorus raithmai*
5. Eyelids fused to form spectacles ................6
   Eyelids movable .........................................7
6. Ear hidden beneath scales ............................ ............................ *Ablepharus grayanus*
   Ear opening small but distinct .........................*Ablepharus pannonicus*
7. Supranasal scale present.............................8

Supranasal scale absent............................ 9

8. Scales of middorsal rows much wider than laterals............................................ 10
Scales of dorsal side of body equal in size throughout.............................................. 13

9. Scales at midbody 24-30........ ............................*Scincella himalayana*
Scales at midbody 32-36............................ ............................. *Scincella ladacensis*

10. Broad dorsals in a single row ............................*Eurylepis taeniolatus*
Broad dorsals in a double row ................. 11

11. Middorsals 26-30; dorsum uniform brown or with 3 more or less distinct dark stripes..................................................... 12
Middorsals 52-56; 5-7 dark brown dorsal stripes...............*Novoeumeces indothalensis*

12. Dorsum uniform brown or with three more or less distinct dark stripes.................................. .......*Novoeumeces (schneiderii) zarudnyi*
Dorsum pale gray, vermilian stripes from temporal to groin, scattered orange scales on body ................ *Novoeumeces blythianus*

13. Naris piercing nasals............................... 14
Naris between nasals and rostral ...............................*Chalcides ocellatus*

14. Limbs well developed, pentadactyl ......... 15
Limbs short and vestigial............................ ...............................*Lygosoma punctata*

15. Supranasals in contact with each other; dorsals with 3 keels..................................... *Eutrophis dissimilis* Supranasals separated from each other, dorsals with 3-7 keels....... .............................*Eutrophis macularia*

### 1. *Ablepharus grayanus* (Stoliczka)
(**Fig.8.1**)

1. Ear opening obscure, position indicated by a shallow depression.
2. Scales around the midbody 18-20.
Snout-vent length 32-33 mm, tail 54-58 mm.

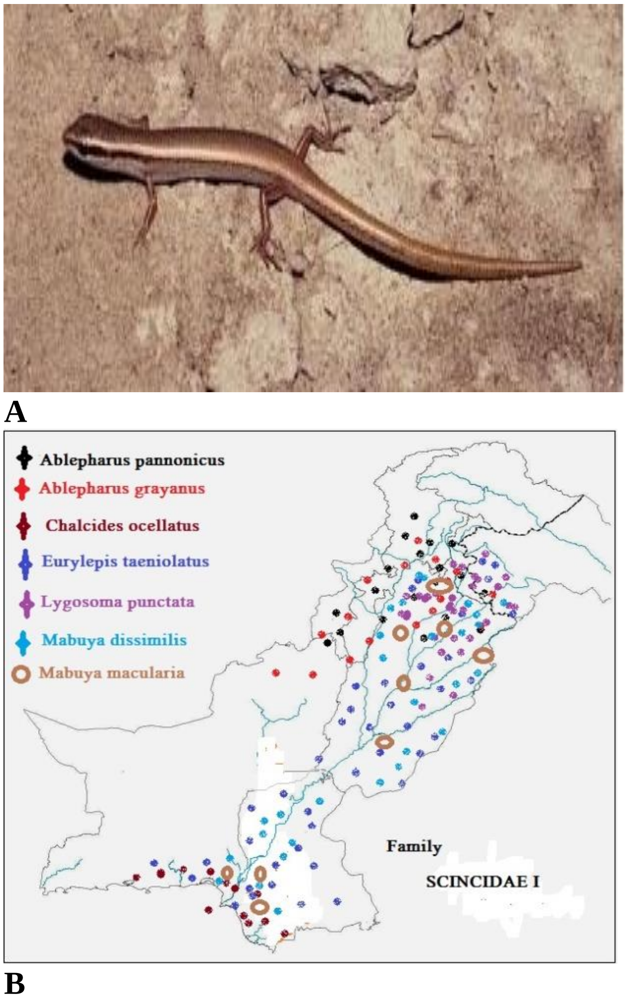


**Fig.8.1.** *Ablepharus grayanus* (Stoliczka). B shows distribution of different genera of family Scinidae in different parts of Pakistan.

*Colour*:
Body olive greenish with distinct metallic luster, flanks speckled or streaked with dark brown. A light stripe from superciliary edge to the base of tail, edged above and below with black.

*Habitat*:
Frequents leaf litter and prostrate vegetation, inhabits the moist environs under fallen leaves in gardens and oases, grasslands, backyard gardens, and extend into the inhabited houses.

*Range*:
Recorded from throughout Pakistan at low elevations, especially grass fields in the Indus riparian system. It has also been recorded from hills around Fort Munro, Dera Ghazi Khan at an elevation of 1800 m.

### *2. Ablepharus pannonicus* (Fitzinger)
(**Figs.8.2 & 8.1B**)

1. Small distinct ear opening, partially hidden by scales.
2. Number of scales around midbody 20, rarely 22.
   Snout-vent length 40-55 mm, tail 100-120 mm.

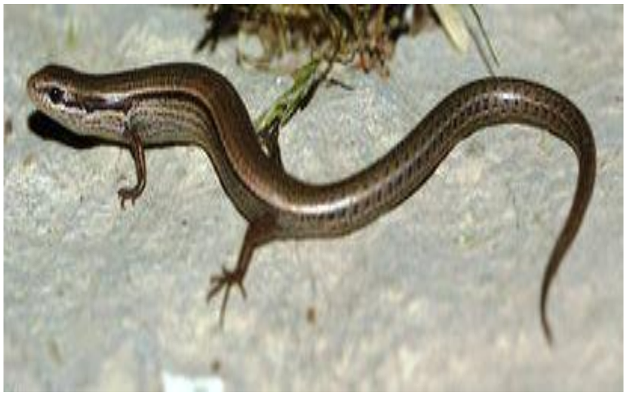


**Fig.8.2.** *Ablepharus pannonicus* (Fitzinger).

*Colour*:
Olive brown dorsum with metallic luster. A distinct dark brown dorsolateral stripe, edged above with white. Flanks with indistinct dark longitudinal lines. Supralabials cream, chin and throat whitish, flecked with blue, ventrum pale bluish gray; limbs and tail tinged with red.

*Habitat*:
Inhabits stony hillsides, with thick growth of low grasses and herbs, under fallen needles of pine trees at an elevation of 2000 m. Its slippery body and small size make it difficult to capture.

*Range*:
From the Arabian Peninsula and North Arabian Desert, through Iran to circum-Mediterranean region, Tajikistan and Afghanistan. In Pakistan it has been reported from around Quetta, Waziristan hills, Chitral and the Salt Range.

### *3. Chalcides ocellatus* (Forskål)
(**Figs.8.3 & 8.1B**)

1. Naris between nasal and rostral scales.
2. Supranasal scale present.
3. Prefrontal and frontoparietal scales absent.
4. Limbs short, pentadactyl.
   Snout-vent length 105-115 mm, tail 70-75 mm

*Colour*:
Dorsum bronze, sides pale yellow; dark scales are arranged in irregular transverse rows on body, in more regular annuli on tail. Each dark scale has a median light bar. Head is speckled with dark. Labials cream with dark bars.

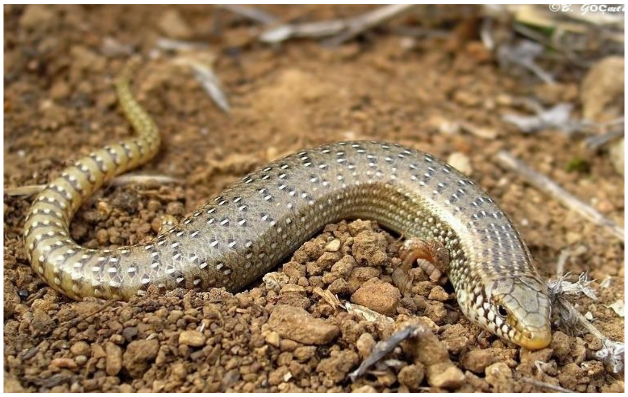


**Fig.8.3.** *Chalcides ocellatus* (Forskål).

*Habitat*:
Warm humid areas with scrubby vegetation, in rocky and sandy terrain. It is secretive in habits. Viviparous, it gives birth to 4-6 young ones.

*Range*:
From the Mediterranean through northern Saudi

Arabia, the Persian Gulf to the Makran coast. In Pakistan it has been recorded from along the coastal strip, around Karachi and Astola Island.

### *4. Eurylepis schneideri* Daudin

(**Fig.8.4**)

1. Second supraocular larger than first.
2. Fromto-parietal in contact with each other, much smaller than nterparietals, which completely separate the prietals.
3. 3-5 pairs of nuchals.
4. Nasal large, no postnasal.
5. Anterior loreal higher than long, smaller than posterior loreal, in contact with supranasal.
6. Ear opening with 3-4 large pointed lobules interiorly.
7. 26-30 scales round midbody, two median dorsal rows distinctly broader than laterals.
8. 58-62 dorsal scales in longitudinal series. Snout-vent 170; tail 200 mm.

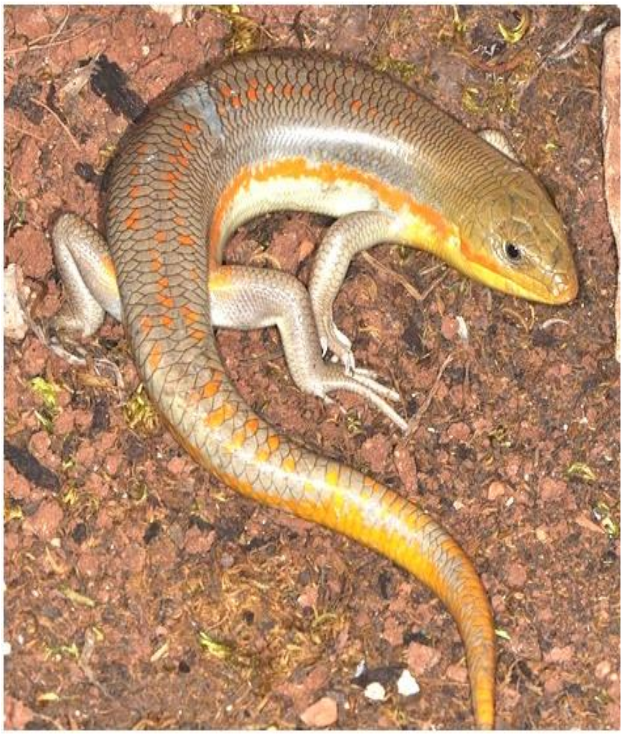


**Fig.8.4.** *Eurylepis schneideri* Daudin.

*Colour*:

Young olive-grey or brownis, uniform or wih three more or less distinct dark stripes or with golden spots or stripes. Abdomen yellowish-white.

*Range*:

Makrsan coast, northern Balochistan, Waziristan, asia mirror Persia, Arabia to north transcaspia.

### *5. Eurylepis taeniolatus* (Blyth)

(**Figs.8.5 & 8.1B**)

1. Number of scales round midbody 21-23.
2. A postnasal scale present.
3. Two median rows of dorsal scales fused into a broad median row. Snout-vent length 160-165 mm, tail 299-225 mm.

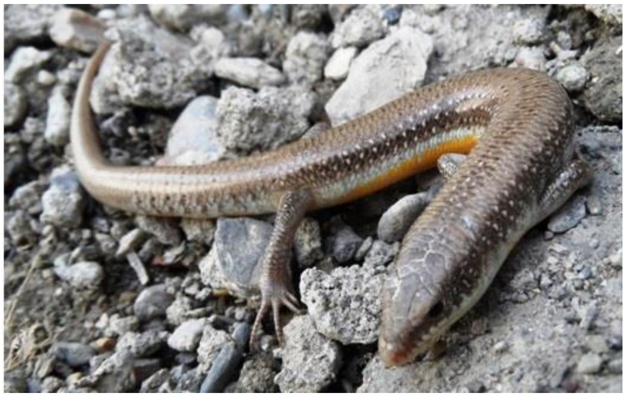


**Fig.8.5.** *Eurylepis taeniolatus* (Blyth).

*Colour*:

Dorsum pale sandy to bronze, speckled with cream. Three dark brown stripes with scattered light flecks run on the body. Tail speckled and variegated black, brown, and pale gray. Ventrum vivid yellow. In juvenile each yellow scale is edged with black, and there is no stripe on the dorsum.

*Habitat*:

Inhabits loose sandy soil or loamy with scrubby vegetation, in almost deserticolous habitat, mostly close to water courses.

*Range*:
Reported from Arabia to the Transcaspia, Kutch, and Sindh to Kashmir. In Pakistan it has been collected from throughout the plains of Punjab and Sindh to an elevation of 2000 m.

### 6. ***Lygosoma punctata*** (Linnaeus)
(**Figs.8.6 & 8.1B**)

1. Lower eyelid with undivided transparent disc.
2. Fingers and toes 5.
3. Number of scales around the midbody 24-28.
4. Tail longer than body.
   Snout-vent length 85-91 mm, tail 120-139 mm.

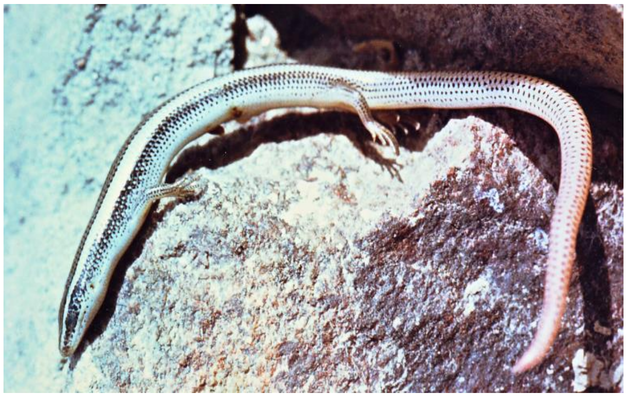


**Fig.8.6.** *Lygosoma punctata* (Linnaeus).

*Colour*:
Body brown, each body scale with a dark basal spot. In juvenile there are 4-6 longitudinal stripes down the back. A canthal yellowish streak strongly marked in young. Ventrum uniform yellowish white or each scale with a dark central mark. Tail reddish.

*Habitat*:
Inhabits grass fields with moderate moisture and shade, ideally available in gardens and orchards and around big cities. This skink is common in the lawns of large buildings around Lahore, where it extends into backyards of houses and often comes to live under household articles. It slips from one object to another and is difficult to catch.

*Range*:
Wide range in the Indo-Gangetic plains, from Bangladesh through India and Sri Lanka. In Pakistan, it is restricted to the eastern strip of Punjab plain, northward it extends into Hazara Division.

### 7. ***Eutrophis dissimilis*** (Hallowell)
(**Fig.8.7**)

1. Supranasals in contact with each other.
2. Frontonasal almost as broad as long.
3. No potnasal scale.
4. An undivided transparent disc in lower eyelid.
5. Dorsal and lateral body scales subequal.
6. Dorsals with 2 or 3 laterals with 3 keels.
   Snout-vent length 53-55 mm, tail 69-70 mm.

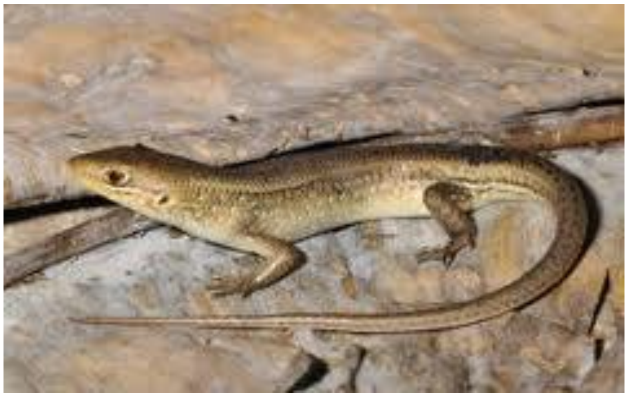


**Fig.8.7.** *Eutrophis dissimilis* (Hallowell).

*Colour*:
Dorsum light brown, with 3 or more greenish white stripes, a median dorsal and 2 dorsolateral; stripes are edged with transversely arranged

black spots. The sides of the body are spotted with white dark-edged spots. Ventrum yellowish white. Eyelids edged with bright yellow.

*Habitat*:
Inhabits open moist grass fields and extends in tilled land where it is killed into large numbers, as people commonly believe it to be a “deadly poisonous legged snake".

*Range*:
From western Bengal, Bihar, across the Gangetic plain to Rawalpindi, upper Indus Valley to Waziristan, and extends into the Indus Delta.

### 8. *Eutrophis macularia* (Blyth)
(**Fig.8.8**)

1. Supranasals are separated from each other.
2. Frontonasals about as long as broad.
3. A postnasal may or may not be present.
4. Scaly lower eyelid.
5. Dorsal and lateral body scales are subequal, with 5-9 keels.
   Snout-vent length 68-70 mm, tail 63-65 mm.

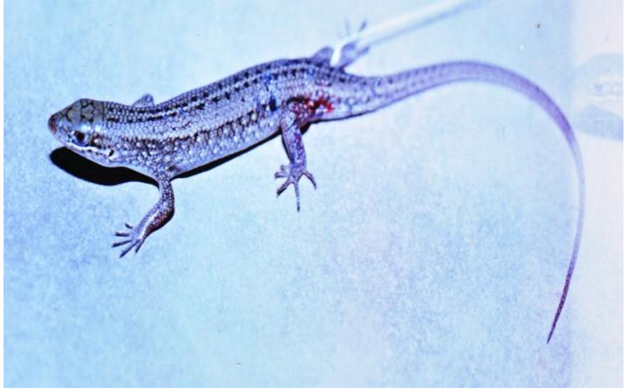


**Fig.8.8.** *Eutrophis macularia* (Blyth).

*Colour*:
Dorsum uniformly iridescent bronze, or specked with black. Sides of body darker, with rows of white dots. Female brown to gray, with sparse light dots, or dots may be absent. Ventrum white. Male with vermilion lips and flanks during breeding season.

*Habitat*:
A human commensal, inhabiting grasslands, open fields, farmlands, and parks and gardens close to human habitations, seldom venturing in buildings.

*Range*:
From Laos and Cambodia to northern Malaya, Myanmar, western Bengal, and Bihar, across the Indo-Gangetic Plain, to the Iranian Plateau. In Pakistan it has been reported from the plains and highland of the Salt Range, in Punjab, around Karachi and Las Bela.

### 9. *Novoeumeces blythianus* (J. Anderson)
(**Fig.8.9**)

1. A single azygous postmental.
2. Nuchals 2- 4 pairs.
3. Number of scales round the midbody 28-30.
   Snout-vent length 85-89 mm, tail 149-154 mm.

*Colour*:
Dorsum pale gray, with vermilion stripes from temporal to the groin, tail vermilion to orange. Body and back with scattered orange scales, lips and chin chrome yellow, ventrum white.

*Habitat*:
Inhabits rocky to hard soil terrain with low vegetation.

*Range*:
From coastal areas of Pakistan. It has also been reported from near the Khyber Pass in northwestern Pakistan, close to the Afghan border.

### 10. *Novoeumeces indothalensis*

(M. S. Khan and M.R.Z. Khan)

(**Figs.8.10 & 8.9B**)

1. Dorsal pattern of 5-7 dark brown stripes, extending onto the tail.

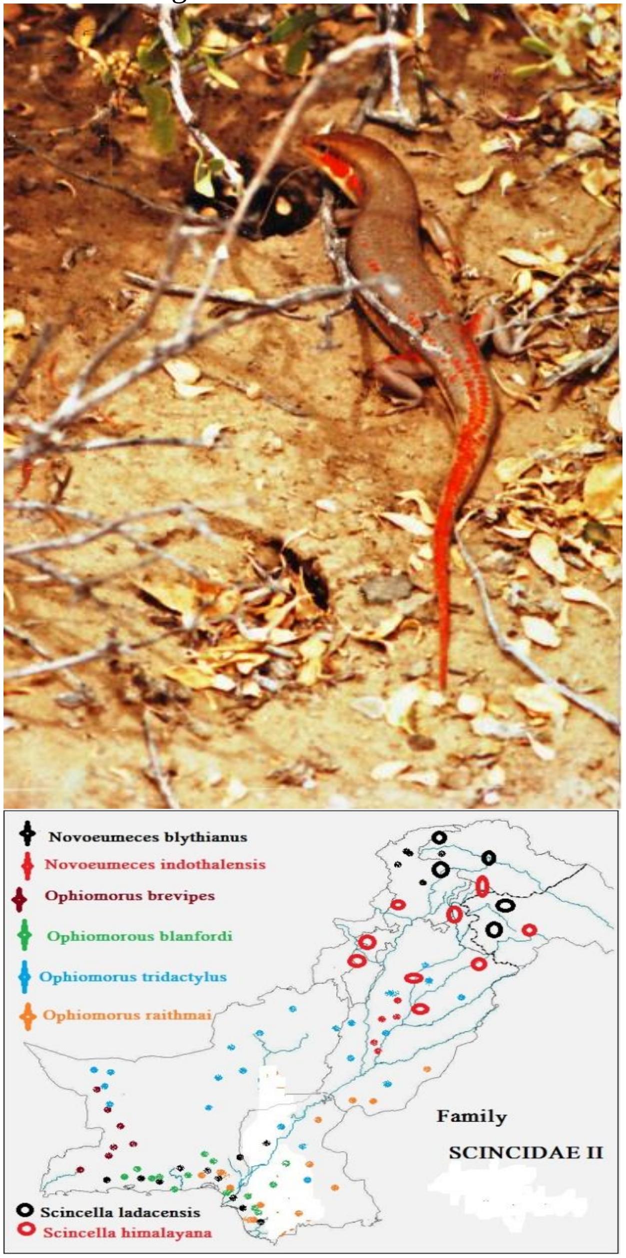


**Fig.8.9.** *Novoeumeces blythianus* (J. Anderson). B shows distribution of various species of the family Scinidae in different part of Pakistan.

2. Nasal scale is resting on first supralabial; nasal suture horizontal; no postnasal.
3. Interparietal about half the size of frontal and is of the same shape.
4. Azygous postmentals 2.
5. Middorsal row of 52-56 wide paired scales.
6. Posterior loreal and presuboculars are longer than deep.
7. No intercalary scales between subdigital lamellae.
   Snout-vent length 54-57 mm, tail 40+ mm

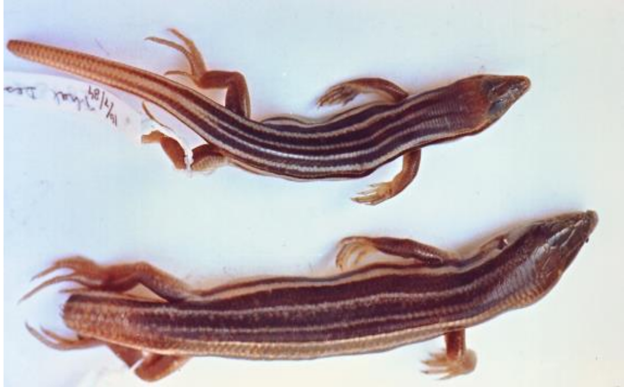


**Fig.8.10.** *Novoeumeces indothalensis* **(**M.S. Khan and M.R.Z. Khan).

*Colour*:

In formalin, 7 vivid dark brown longitudinal stripes on the body: median dorsal starts from behind interparietal and extends to the level of vent; second dorsal, paired, from behind parietals to the level of vent, join each other at the level of vent, do not extend onto the tail; third paired, from behind eye extends laterally to groin rather than along lateroventral side of tail; fourth paired from behind ear above shoulder to groin. The stripes are separated from each other by narrower lighter stripes, making the pattern distinct. Head is uniformly brownish, lips, chin, and ventrum light yellowish.

*Habitat*:

Collected from the roots of a common reed bush, *Sachharum moonja*, close to the tilled fields, from sandy soil. The reeds were uprooted to expose the lizards.

*Range*:
From the southwestern Thal Desert, close to the left bank of the River Indus, southwestern Punjab, Pakistan.

### *11. Novoeumeces zarudnyi* (Nikolsky)

(**Fig.8.11**)

1. Postmentals paired, azygous.
2. Nuchals 3-5 pairs.
3. Number of scales around the midbody 26-30. Snout-vent length 110-115 mm, tail 220-240 mm.

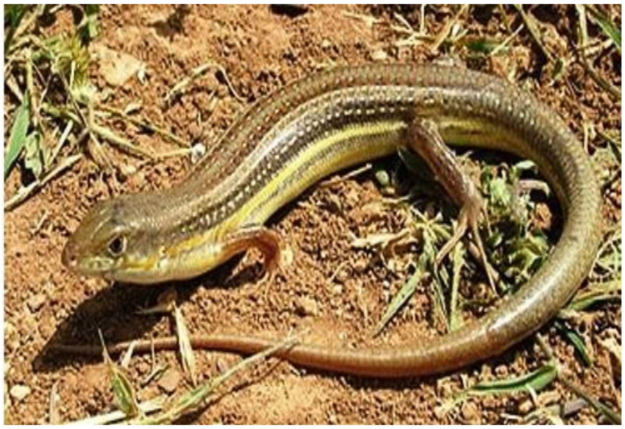


**Fig.8.11.** *Novoeumeces zarudnyi* (Nikolsky).

*Colour*:
Body blue to steel gray, ventrum white. A broad bright orange red to vermilion stripe from temple to the groin. Tail orange-red.

*Habitat*:
This skink has been collected from Island Astola, 10 km off the coast of Karachi, from a rocky terrain, with scrubby vegetation and in humid environments (Mertens,1969). It has also been recorded from the Kharan Desert, around oases, where it burrows in the roots of thorny bushes. The lizard is diurnal, feeds on different kinds of desert arthropods. The prey is crushed in powerful jaws. Breeding is quite extended from late February to September, 6-7 eggs with pliable shells are laid in burrows, young are quite common by May.

*Range*:
Reported from central to southeastern Iran. In Pakistan, so far it is recorded from Astola Island, 10 km off the coast of Karachi (Mertens 1969a).

### *12. Ophiomorus blanfordi* Boulenger

(**Fig. 8.9B**)

1. Interparietals as long as broad.
2. Frontonasal not twice as long as broad.
3. Scales around midbody 20.
4. Fingers 4, toes 3.
   Snout-vent length 70-84 mm, tail 75-80 mm.

*Colour*:
In life, dorsum golden yellow to brownish, tail paler tending to gray, ventrum pearly white. Tail sky-blue in young. In preserved specimens, dorsum cream or pale brown, median 2 rows of dorsals with scattered dark spots, arranged in distinct longitudinal lines. Third and fourth rows from the vertebral line, on flanks, are with dark brown dots arranged in lines extending on to sides of the head. Head with or without a central dark streak.

*Habitat*:
This sand lizard has been collected from coastal sand dunes, with sparse vegetation. It is nocturnal, glides sinuously under the sand, its movements visible from the surface by characteristically disturbed sand. It occasionally comes out to prey upon a passing arthropod. During the day it rests buried in shade at the root of vegetation.

It breeds from March to July; 4-8 young are recorded.

*Range*:
It is known from coastal Makran, and extends into the adjoining coastal Iran.

### *13. Ophiomorus brevipes* (Blanford)

(**Figs.8.12 & 8.9B**)

1. Interparietal considerably broader than long.
2. Frontonasal about twice as broad as long.
3. Scales around midbody 22.
4. Fingers 4, toes 3.
   Snout-vent length 96-98 mm, tail 86-90 mm.

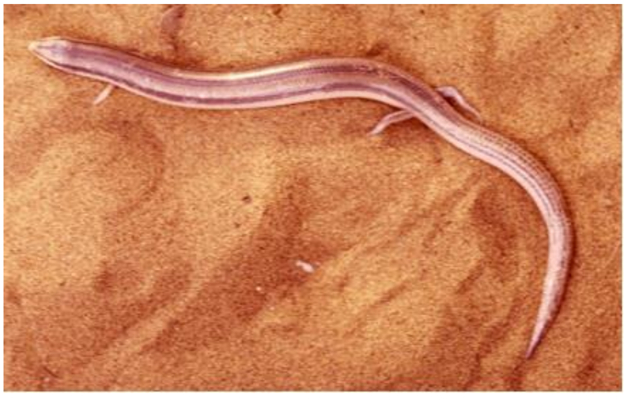


**Fig.8.12.** *Ophiomorus brevipes* (Blanford).

*Colour:*
Dorsum golden yellow, dorsal stripes occupy 10 rows of dorsal scales, arranged in 3 very distinct stripes, 1 vertebral and 2 dorsolateral.

*Habitat*:
This sand lizard is found in similar habitat and as in the preceding species.

*Range*:
Recorded from along the Iran and Pakistan border.

### *14. Ophiomorus raithmai* S. Anderson and Leviton

(**Figs.8.13 & 8.9B**)

1. Parietal not in contact with the anterior temporal.
2. Supranasal usually narrowly in contact and partially separated from each other by the tip of rostral scale.
3. Prefrontal in contact with upper labials.
4. Scales around midbody 22.
5. Both fingers and toes 3.
   Snout-vent length 82-90 mm, tail 74-79 mm.

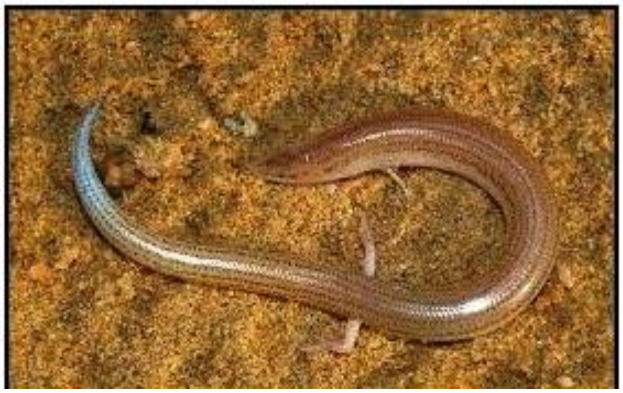


**Fig.8.13.** *Ophiomorus raithmai* S. Anderson and Leviton.

*Colour*:
In life, dorsum pale brown, often suffused with yellow ocher. Upper center of each scale is intensely ocher with dark brown spots. In formalin, cream or pale brown, scales of 8-10 median rows with dark brown line formed by discrete dots, extending from nape to the level of hind limbs, onto tail. Hind limbs with dark brown dots. A dark brown line from nostril through eye, across temporals. Dark brown markings on median head scales. Ventrum cream. Young has blue tail

*Habitat*:
The sand-fish is found in typical sand-dune

habitat with sparse vegetation of grasses. It glides under the sand surface leaving a distinct sinuous track on the surface, occasionally emerging for a short time. It burrows to a depth of half meter, where the upper dry sand layer meets the deeper moist layer. Tracks of skinks radiate out from in the roots of the bushes where the lizards have been resting for the day. Though the lizard is diurnal, its nocturnal activity has also been recorded (Minton 1966).

The stomach contents, apart from copious amounts of sand grains, contain remains of termites and other soft-bodied arthropods (Minton 1966).

Breeding season extends from March to May, and young are met with during June and August.

*Range*:

Reported so far from Kathiwar, in India, various localities in Sindh and Las Bela in Pakistan.

### *15. Ophiomorus tridactylus* (Blyth)

(**Figs.8.14 & 8.9B**)

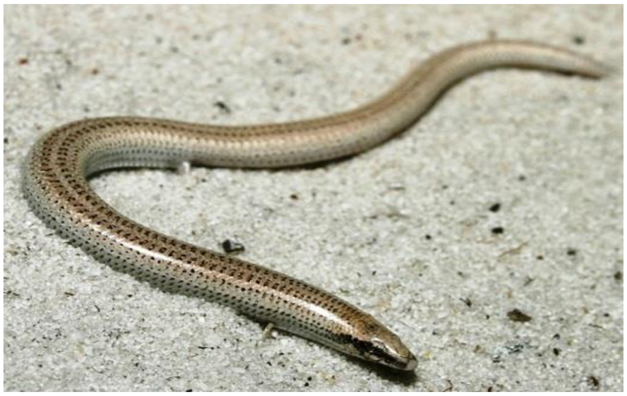


**Fig.8.14.** *Ophiomorus tridactylus* (Blyth)

1. Supranasals usually narrowly in contact, partially separated from one another by the posterior tip of the rostral scale.
2. Prefrontals in contact with upper labials.
3. Parietal in contact with anterior temporal.
4. Postocular about as large as posterior subocular.
5. Scales around midbody 22.
6. A distinct ventrolateral ridge from snout to groin.
7. Fingers and toes 3.

   Snout-vent length 89-92 mm, tail 25-27 mm.

*Colour*:

Dorsum yellow to khaki, tail tends to be grayish, ventrum white. Tail in juvenile sky blue.

*Habitat*:

The skink inhabits fine loose sand fields, usually along the moist soil of water courses where it is confined to the sandy banks, to the limit of the vegetation.

*Range*:

Reported from along the borders between Afghanistan, Iran, and Pakistan. In Pakistan it is known from western Balochistan**,** Dera Ghazi Khan, Thal and Cholistan Deserts, Punjab, Pakistan.

### *16. Scincella himalayana* (Günther)

(**Figs.8.15 & 8.9B**)

1. Scales around midbody 26-30.
2. Prefrontals usually separated from each other.

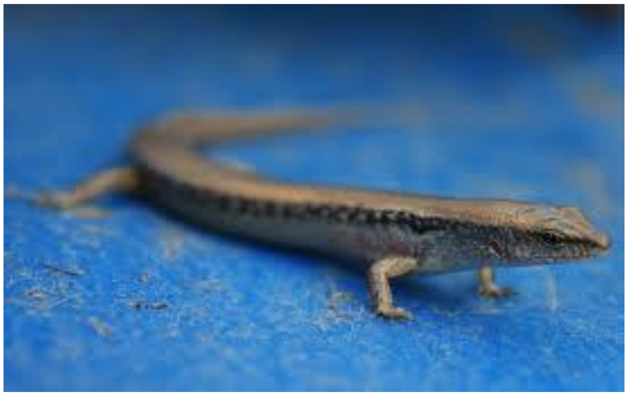


**Fig.8.15.** *Scincella himalayana* (Günther).

3. Lamellae under fourth toe 14-20.
   Snout-vent length 67-70 mm, tail 64-70 mm.

*Colour*:
Dorsum iridescent bronze, with indistinct light or dark specks, a dark vertebral stripe present in some individuals. A narrow yellow lateral stripe with irregular edge, another narrow dark brown stripe extends from snout through eye, bordered below by a narrow irregular whitish stripe edged with black. All stripes continuing to the middle of the tail, distal part of it is bronze with light and dark flecks. Head and limbs bronze, with dark speckling, ventrum bluish white.

*Habitat*:
This lizard is found under stones and other objects in moist grass fields along margins of lakes and other water bodies in the Kaghan Valley, at about 3000 m of elevation. It has also been collected along the sides of water courses in alpine Punjab and Azad Kashmir. In Salt Range, it is confined to grass fields in stony terrain, around Sakesar, in Soan Valley, Punjab, Pakistan.

The lizard slips from one stone to another and only a keen eye can follow its movement. In thorny bushy areas, as in Soan Valley, it takes to the roots of bushes from where it is difficult to retrieve. Its burrows are situated under stones; at places it descends into large holes and crevices in the ground. Food mainly consists of arthropods, predominantly butterflies and beetles, and worms have also been recorded from its stomach.

It breeds from April to July; 2-3 oval eggs with pliable shells are laid in moist environs under a stone, and juveniles are seen moving about from May to late August.

*Range***:**
A mountain lizard, it is recorded from Nepal to Turkmenistan. In Pakistan it abounds in marginal vegetation along water courses in alpine Punjab, Salt Range, Chitral, Waziristan, and Kalabag, District Mianwali.

### ***17. Scincella ladacensis*** (Günther)
(**Figs.8.16 & 8.9B**)

1. Scales at midbody 32-38.
2. Prefrontals in contact with each other, or just separated.
3. Lamellae under fourth toe 20-24.
   Snout-vent length 53-56 mm, tail 55-58 mm.

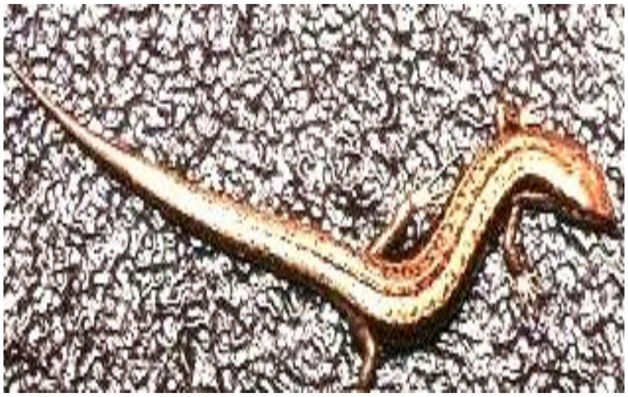


**Fig.8.16.** *Scincella ladacensis* (Günther).

*Colour*:
Bronze or olive dorsum, profusely speckled with black, each speck with a white or golden central mark. A dark brown stripe along sides of the neck and body, spotted with light brown, bordered above with white. Sides with small dark dots. Ventrum bluish or gray, ventral scales bordered with gray.

*Habitat*:
This lizard is alpine in habits, occupies almost the same habitat, and has the same habits as the preceding species.

*Range*: Reported from Kahajeng Khola, in Nepal, the highest altitude (6000 m) so for reported for any cold-blooded vertebrate. In Pakistan it has been reported from Baltistan.

# APPENDIX

## Scientific, common English and Urdu names

| **Family Scincidae** | **Skinks** | ***Raig mahi*** | ریگ ماہی |
|---|---|---|---|
| ***Ablepharus grayanus*** (Stoliczka, 1872) | Earless Snake-eyed Skink: | *Boly saamp-chism raig mahi* | بولی ریگ ماہی |
| ***Ablepharus pannonicus*** (Fitzinger, 1823) | Red tail Snake-eyed Skink: | *Surakh-dum saamp-chism raig mahi* | سرخ دُم ریگ ماہی |
| ***Chalcides ocellatus*** (Forskål, 1775) | Ocellate Skink | *Tikka dar raig mahi* | ٹکے دار ریگ ماہی |
| ***Eurylepis taeniolatus taeniolatus*** (Blyth, 1854) | Yellow-belly Mole Skink: | *Maidani raig-mahi* | زرد شکم ریگ ماہی |
| ***Lygosoma punctata*** (Linnaeus, 1766) | Spotted Garden Skink | *Baghban raig mahi* | باگبان ریگ ماہی |
| ***Eutrophis dissimilis*** (Hallowell, 1860) | Striped Grass Skink: | *Patti-dar Ghas-goodi* | پٹیدار گھاس گُڈی |
| ***Eutrophis macularia* (**Blyth, 1853) | Bronze Grass Skink | *Bhoori Ghas-goodi* | بھوری گھاس کُڈی |
| ***Novoeumeces blythianus* (**J. Anderson, 1871) | Orange-tail Skink: | *Zard ghas goodi* | زرد گھاس گُڈی |
| ***Novoeumeces indothalensis*** (M.S. Khan & M.R.Z. Khan, 1997) | Thal Skink | *Thal raig mahi* | تھل ریگ ماہی |
| ***Novoeumeces schneiderii zarudnyi*** (Nikolski, 1900) | Red-stripe Skink | *Surkh dahari raig mahi* | سرخ دھاری ریگ ماہی |
| ***Ophiomorus blanfordi*** Boulenger, 1887 | Makran Sand Swimmer: | *Makrani raig mahi* | مکرانی ریگ ماہی |
| ***Ophiomorus brevipes* (**Blanford, 1874) | Four-finger Sand Swimmer: | *4-ungushti raig mahi* | چار اُنگشت ریگ ماہی |
| ***Ophiomorus raithmai*** S. Anderson & Leviton, 1966 | Three-finger Sand Swimmer: | *3-ungushti raig mahi* | تین اُنگشت ریگ ماہی |
| ***Ophiomorus tridactylus*** (Blyth, 1853) | Three-toe Sand Swimmer: | *3-toed raig mahi* | تین اُگشتِ پا ریگ ماہی |
| ***Scincella himalayana*** (Günther, 1864) | Himalayan Skink | *Himalayai bahmani* | ہمالیائی باہمنی |
| ***Scincella ladacensis*** (Günther, 1864) | Ladakh Skink | Ladakhi bahmani | لدّاخی باہمنی |

# Chapter 9

## Uromastidae & Varanidae

Family Uromastidae............................................

*Saara hardwickii*

### Family Uromastidae

Key:

1. Body dorsum with uniform granular scales, caudal spines smaller, 20-24 in a row at the base of the tail................................................................ *Saara hardwickii*

   Body dorsum with granular scales interspersed with transverse rows of spiny scales; caudal spines larger, 8-10 in a row at the base of the tail............ *Saara asmussi*

### ***Saara asmussi*** (Strauch)
**(Fig.9.1)**

1. Head with heterogeneous obtusely keeled scales, nape with numerous spinose tubercles.
2. Dorsal scales granular, keeled, interspersed with numerous transverse rows of large pointed tubercles.
3. Tail thick at base, strongly depressed, covered with large spinose tubercles, 8-10 in a row, rounded at their bases, spines separated by 3-4 rows of keeled scales.

   Snout-vent length 255-269 mm, tail 215-220 mm.

*Colour*:
Dorsum pale greenish brown; head, limbs and tail darker; belly dirty yellowish brown, heavily mottled, in female dirty brownish.

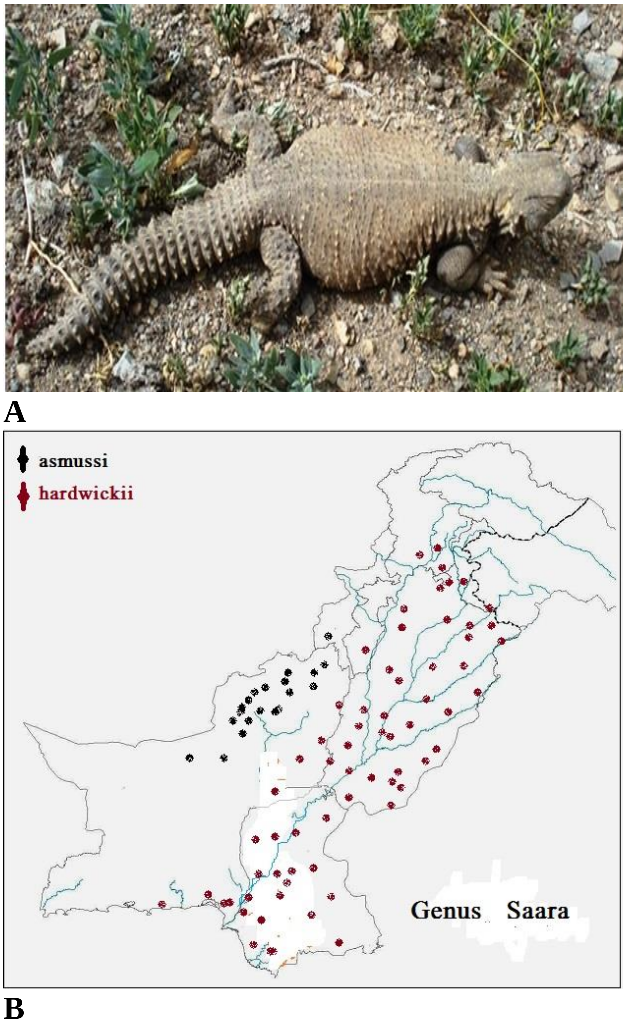


**Fig.9.1.** *Saara asmussi* (Strauch). B shows distribution of *Saara* spp in different parts of Pakistan

*Habitat*:
Frequents deserticolous habitat, at the fringe of sand deserts along the Iran-Afghanistan border. The habitat is a gravel plain soil, with scattered patches of low thin bushes of barilla and tamarisk. The lizard is rather sluggish; however, it is a good runner. Its burrow has a wide opening. It feeds on leaves and flowers of grasses and other vegetation around.

*Range*:
The lizard has been collected from the southern Iran and along the Afghan-Iran border. In Pakistan it has been reported from the Chagai area.

### ***2. Saara hardwickii*** Gray

(**Figs.9.2 & 9.1B**)

1. Head and body with uniform granular scales.
2. Caudal spines squarish at their bases, 20-24 in a row at the midtail.
   Snout-vent length 245-250 mm, tail 160-165 mm.

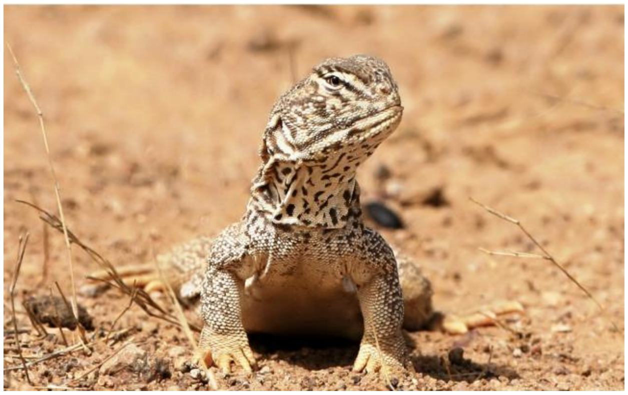


**Fig.9.2.** *Saara hardwickii* Gray

*Color*:
Body dorsum uniformly light sandy gray or yellowish brown, with dark spots or dark vermiculations. Ventrum white, throat spotted with dark. A large distinct blue-black blotch on groin.

*Habitat*:
A characteristic diurnal ground lizard of vast tracts of hard soil throughout the Indo-Gangetic plains. It avoids stony and sandy areas. It makes its burrows in desolate hard soil, areas with sparse vegetation of grasses and bushes. Colonies of lizards are located at slightly elevated areas, probably elevated by the excavated earth.

*Range*:
Widely distributed in barren desolate tracts of hard soil, with moderate to sparse xerophytic vegetation, throughout the Indo-Gangetic plains. In Pakistan it has been recorded from throughout the Indus Valley and extends into Las Bela, southern Balochistan.

## Family Varanidae

**Key:**

l. Tail compressed with a median dorsal ridge; scales on side of neck keeled........... 2
Tail round in cross-section, ridge slightly indicated along the middle of tail; scales on the sides of neck conical.......*Varanus griseus*
2. Naris nearer to the tip of snout than eye ............................... *Varanus flavescens*
Naris nearer to eye than the tip of snout............................*Varanus bengalensis*

### 1. *Varanus bengalensis* (Daudin)
(**Fig.9.3**)

1. Naris a little nearer to orbit than tip of the snout.
2. Scales on head longer than nuchals, which are round, not keeled.
3. Supraoculars small subequal.
4. Abdominals smooth, in 90-110 transverse rows.
5. Digits elongate.
6. Tail strongly compressed with a double toothed dorsal crest.
7. Lateral caudals keeled, a little smaller than subcaudals.
Snout-vent length 815-900 mm, tail 1230 mm.

*Colour*:
Dorsum olive to brown, with dark spots. Ventrum yellowish, with or without dark spots, especially under the neck.

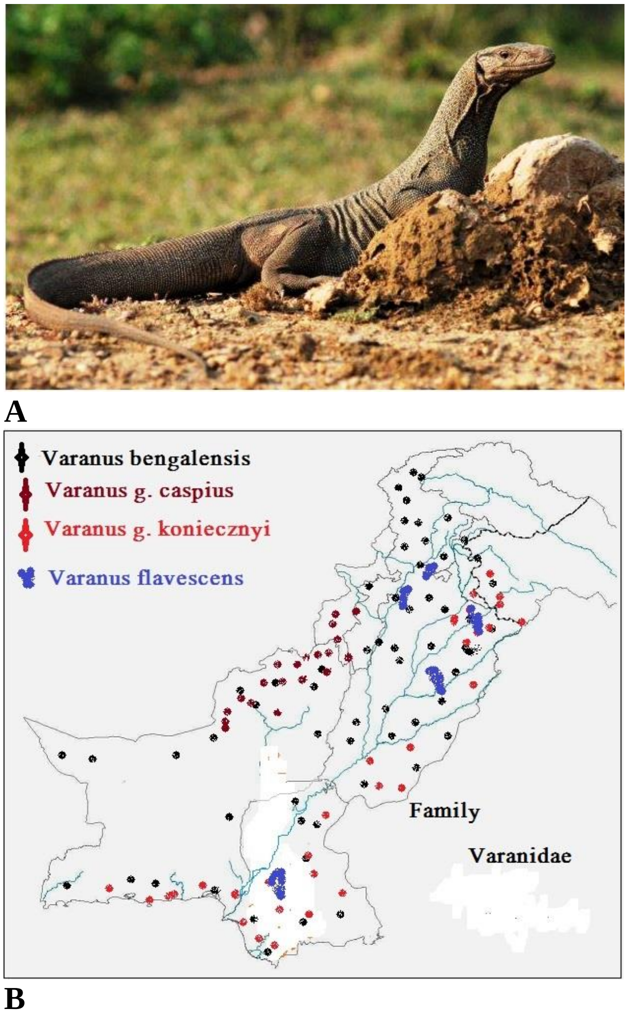


**Fig.9.3.** *Varanus bengalensis* (Daudin). B shows distribution of various species of family *Varanidae* in different parts of Pakistan.

*Habitat*:
Frequents moderately dry forests, and extends into cultivated areas, where it inhabits tracts of barren badlands. It often invades inhabited houses, attracted by poultry and rodents. Essentially a burrower, it is also a good tree climber.

*Range*:
Recorded from Assam, Myanmar, Nepal, Sikkim, throughout India, and Sri Lanka. In Pakistan, it is reported from throughout the

plains of Punjab and Sindh, sub-Himalayan tracts, Waziristan and extends westward into southeastern Iran and eastern Afghanistan.

### *2. Varanus flavescens (*Hardwicke and Gray)

(**Figs.9.4 & 9.3B**)

1 Naris a little nearer to snout tip than orbit.
2. Scales on head smaller than nuchals, which are strongly keeled.
3. Middle supraocular slightly elongated transversally.
4. Abdominals smooth, in 65-75 transverse series.
5. Digits short.
6. Tail strongly compressed, with a double-toothed crest.
7. Subcaudals not much longer than lateral caudal scales.
   Snout-vent length 500-515 mm, tail 575-600 mm.

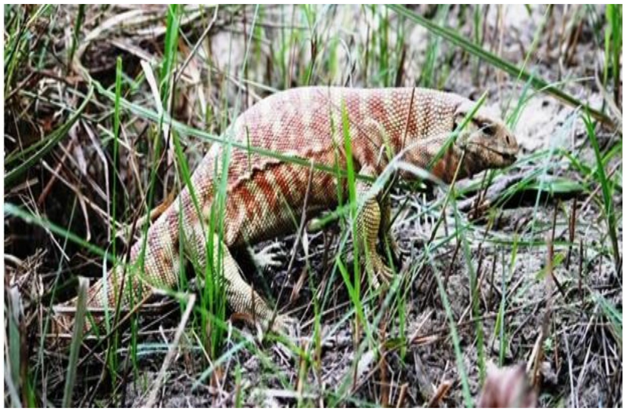


**Fig.9.4.** *Varanus flavescens (*Hardwicke and Gray).

*Colour*:
Dorsum reddish brown, body and tail barred with alternating dark-edged reddish brown and dirty yellow bars, ventrum light yellow.

*Habitat*:
It is a lizard of seasonally flooded forests, and marshy areas in flood plains of the Indus River and its tributaries. It extends into tilled fields along water courses with mesic habitat, and usually burrows in the roots of trees and other vegetation.

*Range*:
The Salt Range, District Sialkot and the Sindh Delta in Pakistan. It is known to extend to the western Bengal.

### *3. Varanus griseus* (Daudin)

(**Fig.9.5**)

1. Naris much nearer to orbit than the end of snout.
2. Head scales longer than nuchals, those on neck conical.
3. Supraoculars small, subequal.
4. Dorsals obtusely keeled.
5. Abdominals smooth in 110-125 transverse rows.
6. Digits moderately elongated.
7. Tail round or slightly compressed at its posterior half.
8. Lateral caudal scales indistinctly keeled, slightly smaller than the subcaudals.
   Snout-vent length 560-579 mm, tail 865-870 mm.

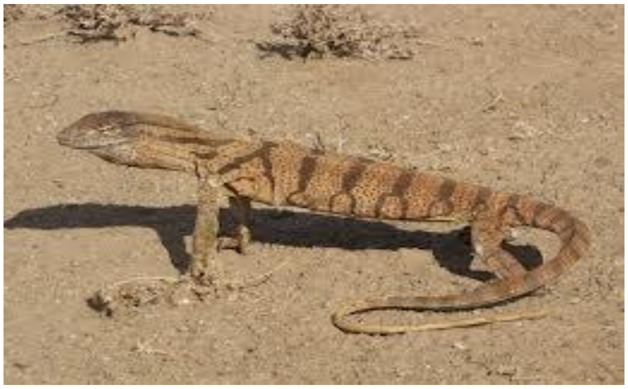


**Fig.9.5.** *Varanus griseus* (Daudin).

*Color*:
Dorsum gray to yellowish brown; body and tail with brownish crossbars; 2-3 streaks on neck; ventrum yellowish. In adult vivacity of dorsal pattern is lost.

*Habitat*:
Varanid of sandy fields with uneven surfaces and tracts of hard soil with sparse vegetation. It excavates burrows in the roots of trees and bushes.

*Range*:
Wide ranging in arid desert areas of India, Pakistan, and the Middle East, from Rajasthan to the Caspian Sea and North Africa.
The Pakistani population distinguished in two races:

### ***Race 1. Varanus griseus caspius*** (Eichwald)

(**Fig.9.3B**)

1. Only the posterior half of the tail is compressed in a dorsal crest.

*Colour*:
Body with 5-6, while tail has 16-19 transverse bands.

*Range*:
From the Transcaspian Desert to southern Khazakistan and Afghanistan, extending into northern and western Balochistan.

### ***Race 2. Varanus griseus koniecznyi*** Mertens

(**Figs.9.6 & 9.3B**)

1. Tail round throughout, without a dorsal crest.

*Colour*:
Body with 4, tail with 10-15 transverse bands.

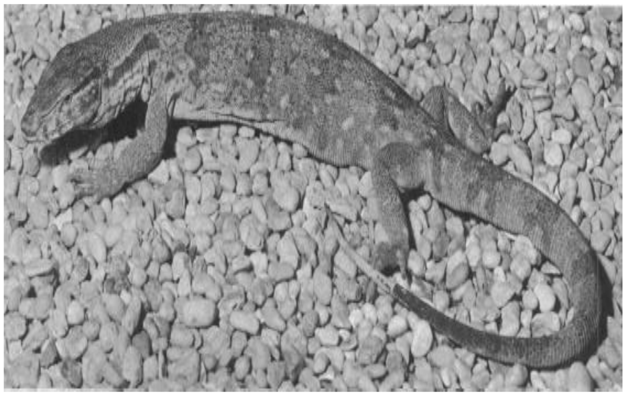


**Fig.9.6.** *Varanus griseus koniecznyi* Mertens.

*Range*:
Deserts of India and Pakistan.

# APPENDIX

## Scientific, common English and Urdu names

| | | | |
|---|---|---|---|
| **Family Uromastycidae** | **Spiny Tail Lizard** | ***Sanda, Khar-dum Kirla*** | سانہ، خار دُم کرلا |
| ***Sara asmussi*** (Strauch, 1863) | Seistan Spiny-tail Lizard | *Seistani sanda* | سیستان خار دُم |
| ***Sara hardwickii*** Gray, 1827 | Indus Spiny-tail Lizard: | *Indus valley sanda* | وادیٔ سندھ خار دُم |
| **Family Varanidae** | **Monitor Lizard** | ***Goh*** | گوہ |
| ***Varanus bengalensis*** (Daudin, 1802) | Bengal Monitor | *Bengali Goh* | بنگالی گوہ |
| ***Varanus flavescens*** (Hardwicke & Gray, 1827) | Yellow Monitor: | *Peeli Goh* | پیلی گوہ |
| ***Varanus griseus*** (Daudin, 1803) | Desert Monitor: | *Registani Goh* | ریگستانی گوہ |
| ***Varanus g. caspius*** (Eichwald, 1831) | Caspian Monitor: | *Koh-kaf Goh* | کوہ کافی گوہ |
| ***Varanus g. koniecznyi*** Mertens, 1954 | Cholistani Monitor | *Cholistani goh* | چولستانی گوہ |

# PART-IV
## SNAKES

*Python molurus*

# Chapter 10

## Non-Venomous Snakes
## Boidae & Colubridae

Family Boidae.....................................................
Family Colubridae ..............................................

### Family Boidae

**Key:**

1. Head with large symmetrically arranged scales; subcaudals in double row …………….........*Python molurus*
   Head with small scales; subcaudals in a single row .................................................2
2. Mental groove present................................3
   Mental groove absent..............*Eryx conicus*
3. Body scales smooth in anterior half; cloacal and caudal scales keeled; 49 scale rows at midbody...................*Eryx tataricus*
   All body scales keeled; 51-61 scale rows at midbody ...................................*Eryx johnii*

### Sand Boas

#### ***1. Eryx conicus*** (Schneider)

(**Fig.10.1**)

1. Head slightly distinct from neck.
2. Rostral wide, not wedge-shaped, without free edge.
3. Nostril slit between nasals and internasal.
4. Supralabials 11-13, infralabials 14-17.
5. No mental groove.
6. Body tapering abruptly posterior to vent, tail very short and blunt.
7. Scales at midbody 45-56, dorsals keeled,

keels particularly heavy in posterior part of body.

8. Ventrals 161-178, subcaudals 18-22. Snout-vent length 730-732 mm, tail 68-70 mm.

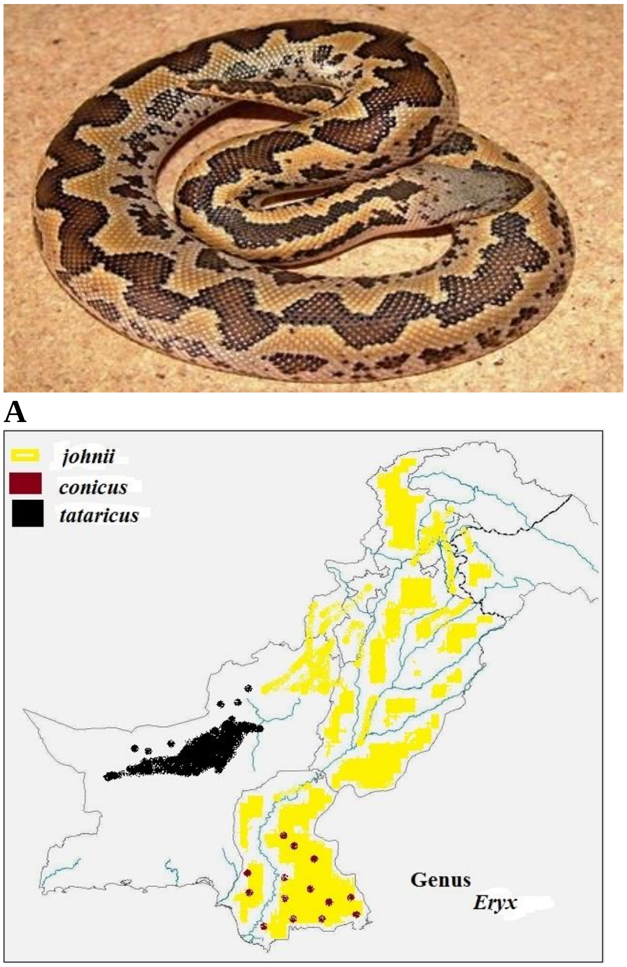


**Fig.10.1.** *Eryx conicus* (Schneider). B shows distribution of species of Genus *Eryx* in different parts of Pakistan.

*Colour*:
Light gray to yellowish or rusty. A series of vertebral irregular dark brown to sooty oval blotches, narrowly edged with dull yellow, usually confluent with each other. A similar lateral irregular series. A dark stripe behind eye. Belly white with scattered gray spots.

*Habitat*:
Frequents comparatively moist sandy and silty soil. Is timid, shy; nocturnal. When in danger bury itself in the soil. When provoked, it throws itself in a coiled ball; when touched it flinches, occasionally slashing to strike with its whole body. The snake allows moderate handling, is of uncertain temperament, bite is painful.

*Range*:
From Bihar, Orissa through India and Sri Lanka. In Pakistan it has been reported from southern Sindh and the Cholistan Desert.

### 2. *Eryx johnii* (Russell)
### (**Figs.10.2 & 10.1B**)

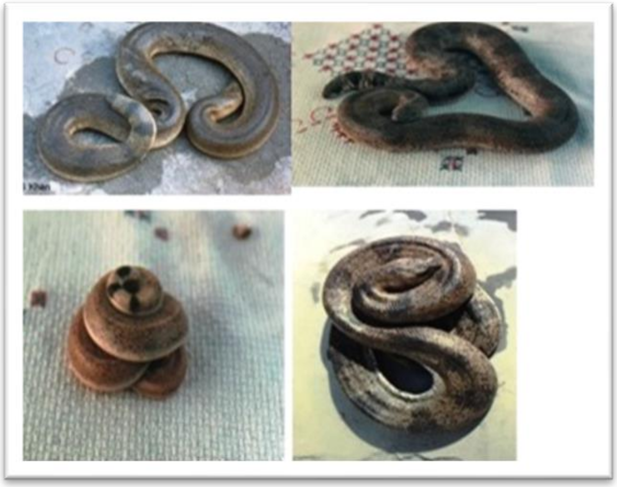


**Fig.10.2.** *Eryx johnii* (Russell).

1. Rostral wide, thick with a ridge.
2. Nostril slit between large nasals.
3. Supralabials 9-12, infralabials 13-18.
4. Scales in circumorbital ring 9-12
5. Scales at midbody 51-61; smooth or weakly keeled in anterior half, while heavily keeled in posterior half of the body.
6. Tail blunt, terminating in small scales
7. Ventrals 190-212, subcaudals 20-40. Snout-vent length 940-945 mm, tail 89-92 mm.

*Colour*:
Juveniles characteristically light reddish in color, with 11-17 dark crossbars on body. Tail lighter with 2-5 crossbars. Ventrum cream, lightly speckled with pale and dark gray.
Body becomes darker with age, with slight traces of bands on a uniformly brown or dark brown dorsum; however, the caudal bars are retained.

*Habitat*: Characteristic of moderate deserts of loose soil with sparse vegetation; it becomes rare in sandy stony and damp soil. It readily invades human habitations, attracted by mice and rats, where it resides in their burrows, a powerful constrictor

*Range*: Occurs throughout central India. In Pakistan recorded from the plains of Punjab, Sindh, and Balochistan. It is reported from eastern Afghanistan and Iran.

### 3. *Eryx tataricus speciosus* Zarevsky
(**Figs.10.3 & 10.1B**)

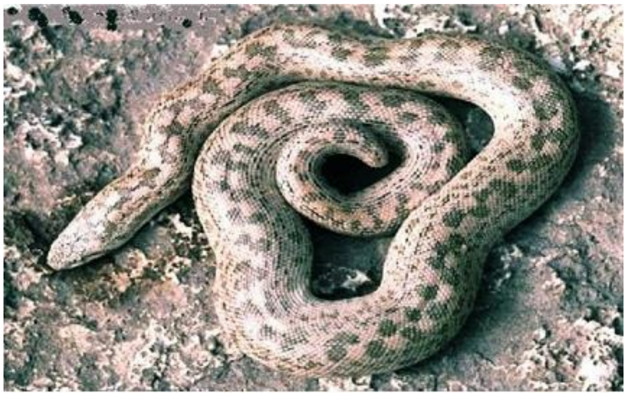


**Fig.10.3.** *Eryx tataricus speciosus* Zarevsky.

1. Rostral much wider than high.
2. Supralabials 11-12, infralabials 16.
3. Circumorbital scales 10-11.
4. Tail blunt, terminating posteriorly in a large shield.
5. Dorsals 49 at midbody, smooth anteriorly, slightly keeled posteriorly.
   Snout-vent length 335-338 mm, tail 45-47 mm.

*Colour*:
Dorsum yellowish brown, lighter on sides. A median series of 45-50 brown irregular blotches. Body flanked with dark flecks and spots. Ventrum lighter.

*Habitat*:
Frequents sandy terrain with sparse vegetation of clumps of grasses and scattered bushes. A timid species which allows considerable handling. However, when alarmed, it throws itself into a ball.

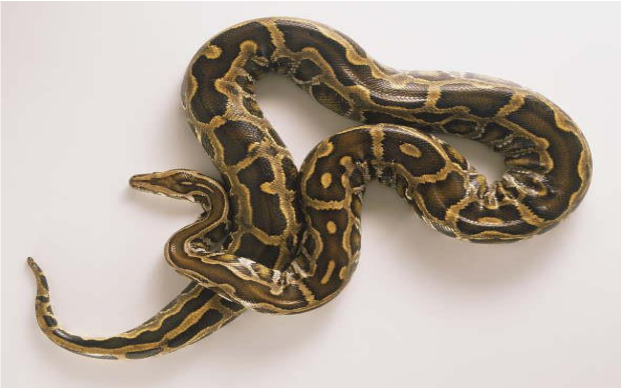
*Range*:
From the Aral Sea to the Altai Mountains and Iran. In Pakistan it is reported from northwestern Balochistan.

### 4. *Python molurus* (Linnaeus)
(**Fig.10.4**)

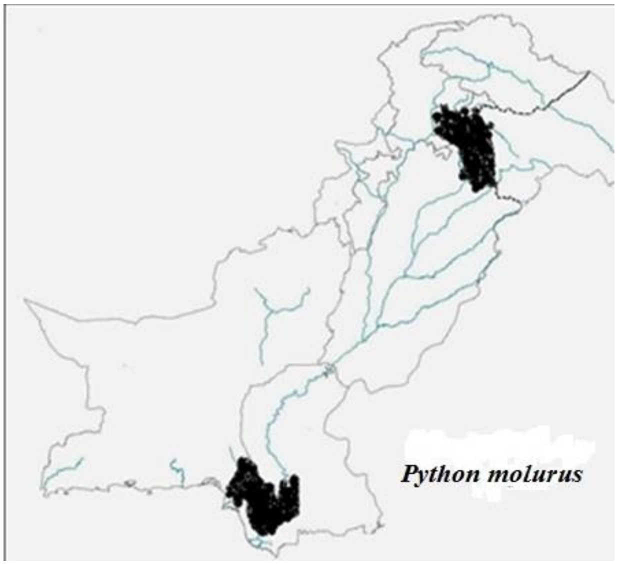
1. Large, heavy bodied snakes; head distinct from neck, with large shields; eye with vertical pupil.
2. Dorsals smooth, 60-75 rows at midbody.
3. Ventrals not extending to the full width of ventrum, 245-278, subcaudals 58-75.
   Total maximum length reached about 6 m.

*Colour*:
Dorsum light yellowish to cream, grayish or brownish above. A median series of large elongated subquadrangular dark gray, brown, or reddish brown dark edged blotches becoming more irregular in posterior half of the body. A postocular and another subocular streak. Ventrum marbled with yellow and dark spots.

*Habitat*:
Inhabits undisturbed thick forests, rocky edges, near marshy areas, close to lakes and streams. It lives close to the water in large dens, in dense clumps of vegetation. In forests it generally occupies hollows of tree trunks. Swims fairly



**A**



**B**

**Fig.10.4.** *Python molurus* (Linnaeus). B shows the distribution of *Python molurus* in different parts of Pakistan.

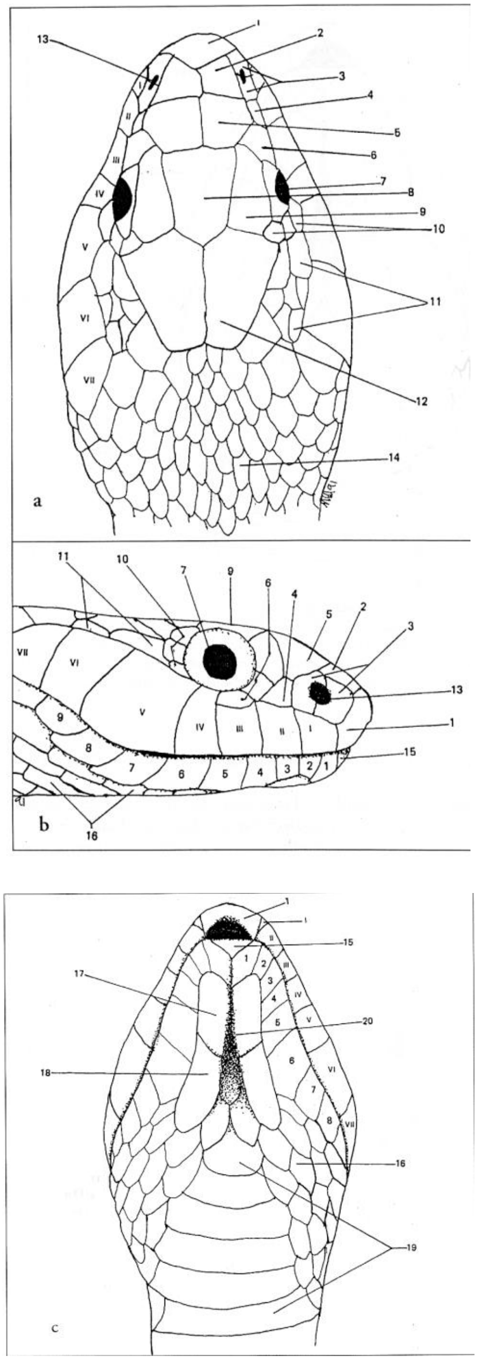
well. It often takes refuge in large caves and unattended ruins of old buildings with clumps of vegetation around, and is reluctant to move away from its established territory.

*Range*:

India, Sri Lanka, Pakistan records are from Azad Kashmir in the north and Indus Delta in the south, washed down by the flood water from north.

## Family Colubridae

### Morphology:
### Colubrid Head Scales Nomenclature



**Legend**

Fig.10.5. Colubrid head scales.

**A. Dorsa1 side:** 1 rostral, 2.internasal, 3. Nasal, 5.prefrontal, 6.preocular, 7. eye, 8. Frontal, 9.supraorbital, 10. postorbitals, 11 temporals, 12 parietal, 13 naris, 14 nuchals.

B. Ventral side: 15 mental, 16 gulars, 17 anterior genials, 18. Posterior genial, 19 ventrals, 20 mental groove.

C. Lateral side: 4 loreal, 5 prefrontals, 6 preoculars, 8 frontal, 9 supraorbital, 10 postoculars, 11 temporals, 12 parietal, I-VII supralabials, 1-9 infralabials

**Key:**

1. Ventrals extend across abdomen; rostral deeply grooved.......................................... 2
   Ventrals do not extend across abdomen; rostral not grooved, projected downward ........................... *Enhydris pakistanica*
2. Subocular scale present; prefrontal fragmented ................................................ 3
   Subocular scale absent; prefrontal not fragmented ................................................ 5
3. Rostral long, wedged between**,** but not completely separating internasals; midbody scales 25................*Spalerosophis arenarius*
   Rostral of normal size; midbody scale rows more than 25 ............................................. 4
4. Belly white with gray smudges; subcaudals less than 100....... *Spalerosophis schirazianus*
   Belly with reddish tint; subcaudals more than 100 .................*Spalerosophis diadema*
5. Dorsals smooth throughout........................ 6
   At least some rows of dorsals keeled....... 29
6. Lower jaw countersunk.............*Argyrogena fasciolata*
   Lower jaw normal...................................... 7
7. Pupil of eye dark, hardly visible in life...... 8
   Pupil of eye large, clearly visible in life .. 10
8. Loreal not or slightly in contact with internasals; subcaudals in a single row ..........................*Lycodon travancoricus*
   Loreal extensively in contact with internasals; subcaudals in pairs .................9
9. Posterior nasal distinctly smaller than anterior; 8 supralabials ......*Lycodon striatus*
   Posterior and anterior nasal scales equal in size; 9 supralabials .......... *Lycodon. aulicus*
10. Rostral large, projecting, concave below; naris narrow slits .....................................11
    Rostral and naris not as above.................13
11. Rostral truncate anteriorly......*Lytorhynchus ridgewayi*
    Rostral pointed ........................................12
12. Fifth labial touching eye .......................*Lytorhynchus paradoxus*
    No labial touching eye ...........*Lytorhynchus maynardi*
13. Pupil elliptical; head much wider than neck 14
    Pupil round, head slightly wider than neck .........................................................16
14. Head black, labials and chin scales dark; ventrals white, without dark speckling ............................*Boiga melanocephala*
    Head and rest of the characters not as above .......................................................15
15. Supralabials 8; nostrils large in a pair of nasal scales ......................... *Boiga trigonata*
    Supralabials 9-10; nostril in a partially divided nasal scale... *Telescopus rhinopoma*
16. Head and nape with a pair of oblique or dark crossbars; fewer than 60 subcaudals ................................................17
    Head and nape not as above; more than 60 subcaudals ...............................................19
17. Scales rows at midbody 15; a thick dark crossbar at nape..........*Oligodon taeniolatus*
    Scale rows at midbody 17 ........................18
18. Head with a thick inverted V-shaped dark stripe, another on nape ... *Oligodon arnensis*
    Head and nape dark brown or black, a large yellow mark on each side of head ...........................*Sibynophis sagittarius*

19. Ventrals fewer than 190 .......................... 20
Ventrals 190 or more .............................. 23

20. Cloacal scale not divided; head elongated .............................. *Psammophis leithii*
Cloacal scale divided .............................. 21

21. Nasal scale completely divided ............... 22
Nasal scale incompletely divided .....................*Psammophis condanarus*

22. Supralabials fourth and fifth or fifth and sixth in contact with eye .......*Psammophis schokari*
Supralabials fourth, fifth and sixth in contact with eye ......*Psammophis lineolatus*

23. Adult exceeds 1250 mm in total length; head scales with regular dark borders ..................................... *Ptyas mucosus*
Adult does not exceed 1100 mm in total body length; no borders around head scales ....................................................... 24

24. Anterior temporals 2; eyes large ............. 25
Anterior temporal 1; eyes small ....................*Pseudocyclophis persicus*

25. Scales at midbody in l9 rows .................. 26
Scales at midbody in 21 rows ......................... *Hemorrhois ravergieri*

26. Dorsals smooth, without keel**s** ................ 27
Dorsals keeled......................................... 29

27. Single labial (5th) touching eye; body dorsum with vivid pattern of sooty black crossbars, scales of bars uniformly black................................. *Coluber karelini*
A pair of supralabials touching eye; dorsum unicolor, or with a pattern of spots or rhombs ................................................ 28

28. Ventrals 199-211, subcaudals 82-119; dorsal pattern of light brown rhombs, center of scales forming pattern lighter ..................*Platyceps ventromaculatus*
Ventrals 205-244, subcaudals 110-144; dorsal pattern of dark spots or unicolor, scales of the pattern unicolor ..........................*Platyceps rhodorachis*

29. Three supralabials in eye ......................... 30
Less than three supralabials in eye .......... 31

30. Ventrals 160 or fewer ....*Amphiesma stolatum*
Ventrals more than 160 ............................*Amphiesma platyceps*

31. A pair of supralabials touching eye..........32
One supralabial touching eye ..................*Xenochrophis cerasogaster*

32. Anterior temporals 1 pair; ventrals 160 or less .........................................................33
Anterior temporal single; ventrals 160 or more...................... *Xenochrophis tessellata*

33. A pair of oblique orbitolabial dark stripes; dorsum light olive, with pattern of dark spots ........................ *Xenochrophis piscator*
Orbitolabial stripes indistinct; dorsum yellowish green, unicolor ................*Xenochrophis sanctijohannis*

### *1. Amphiesma platyceps* (Blyth)

(**Fig.10.5**)

1. Supralabials 8, third to fifth in eye.
2. Midbody scale rows 19, 5-7 middorsal scale rows weakly keeled.
3. Ventrals in male 205-234, in female 191-216; subcaudals divided male 88-98, female 78-96, anal divided.
   Snout-vent length 880-895 mm, tail 230-235 mm.

*Color*:
Variable in coloration: olive brown dorsum, with small dark spots; rarely a dorsolateral series of white spots. Usually a pair of white dark-edged parallel lines on dorsum, or a black line from eye to gape. Labials white or yellow. Ventrum yellowish, bordered with bright red; tail and throat mottled with black.

*Habitat*:
Recorded from Changla Gali, Pakistan. The known habitat of this snake is fast-flowing stream beds where it feeds on fishes, tadpoles, and frogs.

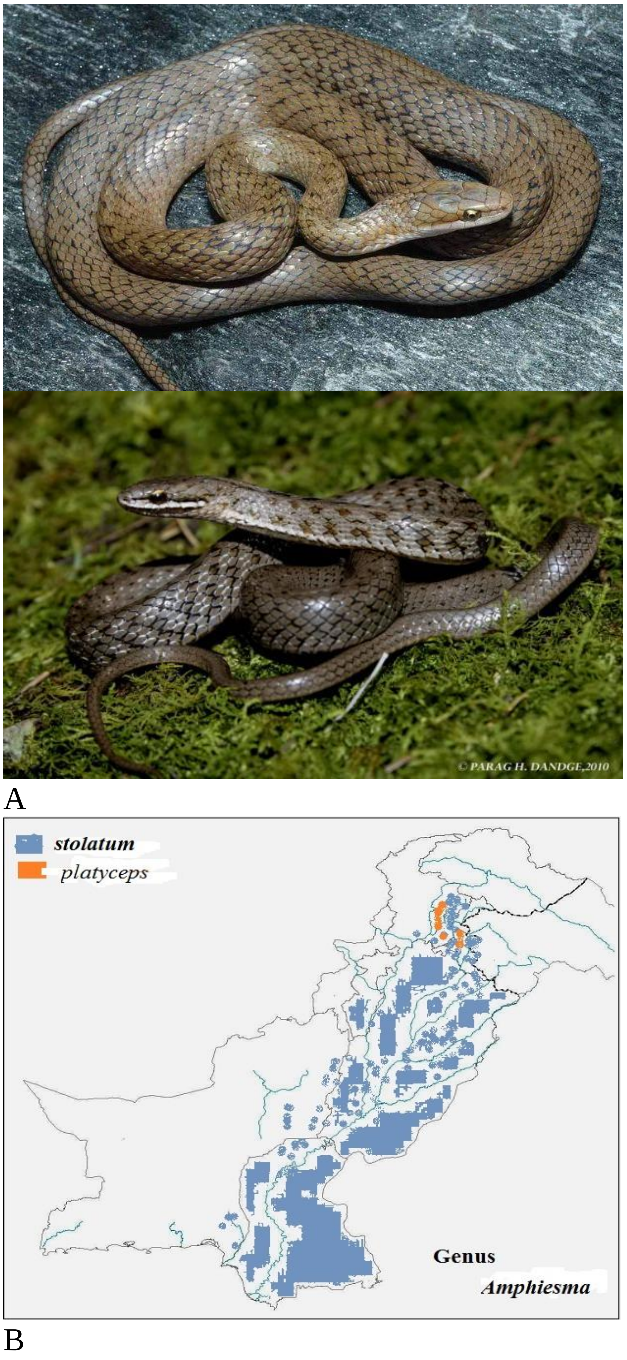


**Fig.10.5.** *Amphiesma platyceps* (Blyth). B shows distribution of species of Genus *Amphiesma* in different parts of Pakistan.

*Range*:
From western to the eastern Siwalicks, between 1500 and 3000 m of elevation. In Pakistan known only from Changla Gali, western Khyber Pakhtunkhwa, Pakistan.

### ***2. Amphiesma sieboldii*** (Günther)

1. Ventrals: male 191-207, female 168-190.
2. Subcaudals: male 97-111, female 81-110.

*Range*:
Recorded from Ghora Gali in alpine Punjab, Pakistan. It has been recorded from Assam in the Eastern Himalayas.

**Taxonomic notes**
Morphologically close to *Amphiesma platyceps*. Boulenger (1890) and Smith (1943) regard these two species synonymous. Malnate (1966) treats them as sibling species.

### ***Amphiesma stolatum*** (Linnaeus)
(**Fig.10.5B**)

1. Head elongate, distinct from neck.
2. Supralabials 7, rarely 8; third and fourth touching eye; infralabials 10, rarely 9 or 11.
3. Posterior genial longer than anterior, not in contact with each other.
4. Scales at midbody 19, reduced to 17, at the level of vent; all scales keeled, except last row.
5. Ventrals 143-150, subcaudals 64-73, divided; anal divided.
   Snout-vent length 490-497 mm, tail 85-90 mm.

*Color:*
Body light olive brown, with a pair of dorsolateral light yellow stripes extending onto the tail. Anteriorly stripes tend to break into spots and dashes. Dark brown to black interstripe spots, more prominent anteriorly. Head bluish gray to olive. Frontal and parietals are edged with black. A V-shaped dark mark on neck. Dark bars in front, below and posterior to the eye. Ventrum white.

*Habitat*:
Characteristic snake of open grassland, frequents mesic habitat with moderate vegetation. It is diurnal and common in tilled fields, barns, under heaps of reaped crops and fallen leaves, logs, heaps of debris, etc. It is a gentle snake which seldom bites, and proves to be a good pet.

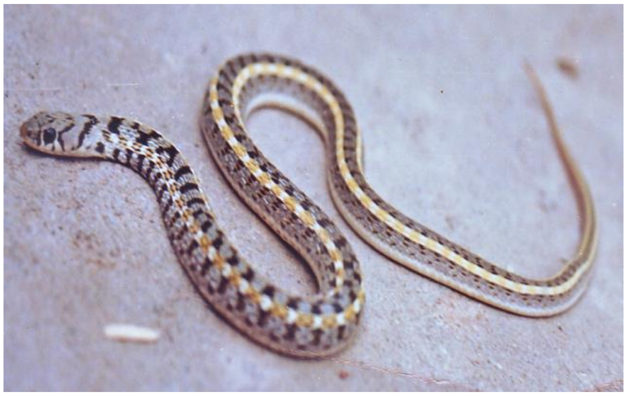


**Fig.10.6.** *Amphiesma stolatum* (Linnaeus)

*Range*:
Most wide ranging snake in the Southeast Asia. It extends from the valley of the Mekong River in Laos, Thailand, north to southern China, then throughout India, Bangladesh, Myanmar, Sri Lanka, to the Indus valley in Pakistan. It does not cross west of the Indus River into Balochistan.

### *4. Argyrogena fasciolata* (Shaw)
(**Fig.10.7**)

1. All scales smooth.
2. Nostrils between nasals and internasals.
3. Supralabials 8, fourth and fifth touching eye; 9-10 lower labials.
4. Both genials of equal size, posterior narrower.
5. Midbody scales 23, reduced to 17 just anterior to vent.
6. Ventrals 212-234; subcaudals 82-94, divided; anal divided.

Snout-vent length 1100-1120 mm, tail 268-275 mm.

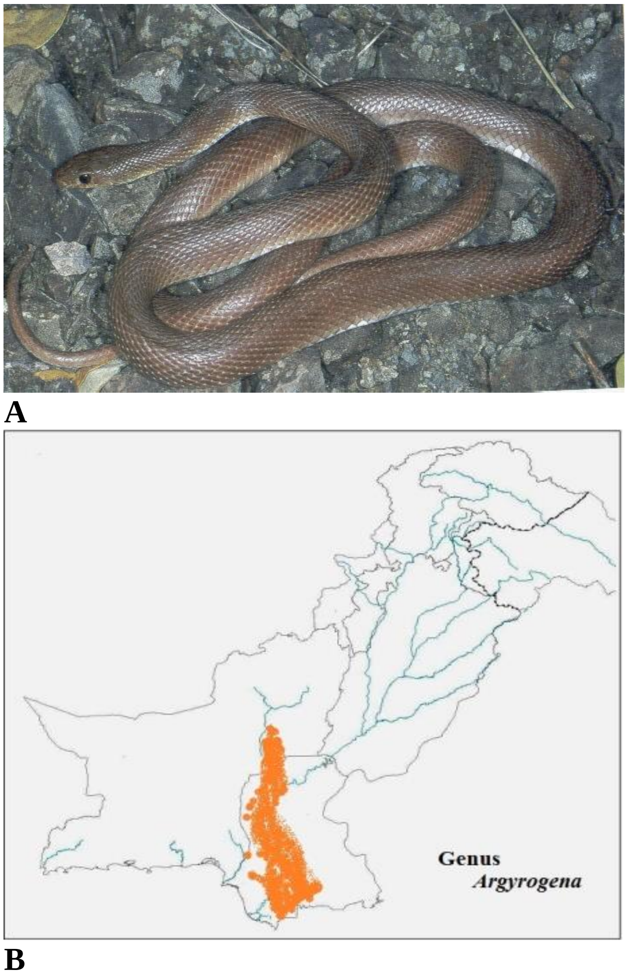


**Fig.10.7.** *Argyrogena fasciolata* (Shaw). B shows distribution of Genus *Argyrogena* in different parts of Pakistan.

*Color*:
Body reddish to grayish brown. Lower sides of scales dark. Adults unicolor, indistinct light grayish crossbars on anterior part of body in juveniles, ventrum cream.

*Habitat*:
Inhabits vast grasslands with moderately loose soil and bushes, infested with rodent burrows. A very alert, agile, and diurnal snake, moving

swiftly through grass and bushes. Moderately bad tempered; when cornered it flattens its neck, hisses loudly, and attempts to bite furiously. It soon becomes a good pet, allowing moderate handling.

*Range*:
From Bangladesh throughout India, Sri Lanka. In Pakistan it is known from Sindh and southern Punjab.

### *5. Boiga trigonata (*Schneider)
### (**Fig.10.8**)

l. Head triangular, flat, very distinct from neck.
2. Eyes large, protruding, with vertically elliptical pupil.
3. Body slender, laterally compressed.
4. All scales smooth, with apical pits, 21, at midbody.
5. Supralabials 8, third and fifth in eye; infralabials 10-11.
6. Ventrals 212-239, subcaudals 76-92; anal not divided.
   Snout-vent length 990-995 mm, caudal 187-190 mm.

*Color*:
Dorsum light brown, a median series of 35-50 irregular transverse oblique white bars margined with black, more distinct anteriorly, fading on tail. Head brownish, with distinct Y-shaped light mark. A postorbital dark bar to angle of mouth. Ventrum dirty white speckled with gray.

*Habitat*:
Thick jungles, plantations, and grasslands with moderately thick bushes. It tolerates high temperatures; however, it is common in fsmesic to humid habitat. It is typically arboreal and lives among branches of trees and bushes, hiding under bark or in holes in tree trunks.

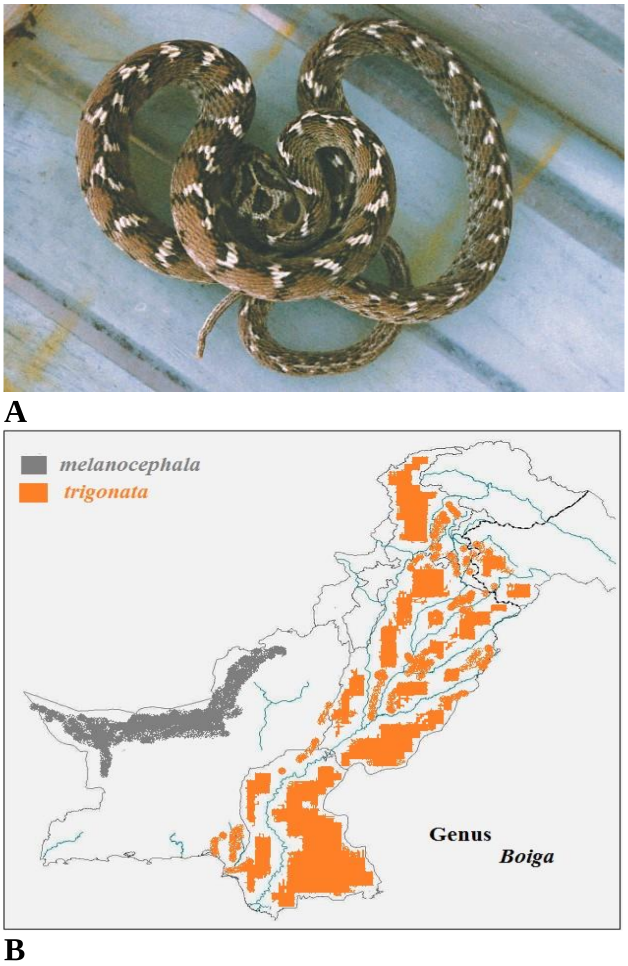


**Fig.10.8.** *Boiga trigonata (*Schneider). B shows distribution of Genus *Boiga trigonata* in different parts of Pakistan.

*Range*: From Bangladesh throughout India, Sri Lanka, Kashmir, and Pakistan, exclusive of higher mountains and Balochistan highland.

### *6. Boiga melanocephala* (Annandale)
### (**Figs.10.9 & 10.8B**)

Morphologically close to *Boiga trigonata* in pholidosis and habits, however, differs from it in body coloration, choice of habitat and in its range.

1. Supralabials 8-9, third to fifth in eye; 10-11 infralabials.

2. Rows of strong diagonally arranged dorsal scales at midbody 21.
3. Ventrals 222-238, 74-94 subcaudals; anal single.
   Snout-vent length 950-955 mm, tail 172-174 mm.

*Color*:
Head top dark gray, with traces of Y-shaped light mark, labials and chin dark. Median dorsal crossbars without dark edges. Ventrum white without speckling.

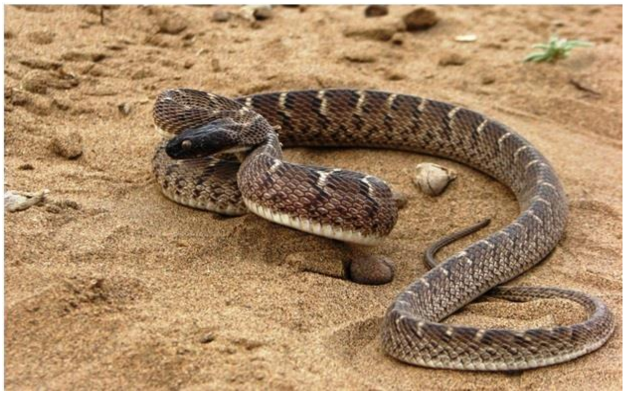


**Fig.10.9.** *Boiga melanocephala* (Annandale)

*Habitat*:
It inhabits desert fields with bushy vegetation and rocky areas with loose soil; it has occasionally been collected from low to moderately high bushes, trees in grassland, and gardens.

*Range*:
From western Balochistan through eastern Iran, Saudi Arabia, north to southern Uzbekistan.

### *7. Coluber karelini karelini*
(**Fig.10.10**)

1. Head long, distinctly wider than neck.
2. Nostrils bordered with nasals and internasals.
3. Two preoculars, upper more than twice the size of lower; 2-3 postoculars, rarely 1.
4. Supralabials 9, rarely 8, only fifth in contact with eye, a large postocular prevents sixth to coming into contact with eye; infralabials 9-10, rarely 11.
5. All scales smooth, 19 at midbody, reduced to 13 at vent.
6. Ventrals 196-209, subcaudals divided 93-97; anal divided.
   Snout-vent length 510-512 mm, tail 140-143 mm.

*Color*:
Dorsum pale gray to yellowish brown, with a vertebral series of 52-57 sooty crossbars, with one or two series of alternating similarly colored smaller spots on sides, outermost row touches tips of ventrals. The pattern is very vivid on body, fades on tail. Head unicolor, a subocular and temporal vivid dark band, loreal and postocular region cream, ventrum milky white.

*Habitat*:
Frequents plain deserts between elevations of 1500-3000 m in northwestern Balochistan. It lives in rodent and lizard burrows or under heaps of vegetation, logs, and stones. It is diurnal, moving about in sparse vegetation of grass and bushes.

*Range*:
Recorded from Transcaspia to Kirghiz and southward to Iran and northern Balochistan, where it is recorded from Quetta and Pishin area. Specimens have also been collected from northwestern Punjab, from Sulaiman Range.

### *8. Coluber karelini mintonorum* Mertens
(**Figs.10.10B**)

1. Only fifth supralabial in eye, Ventrals 192-220. Subcaudals 114-123.
   Snout-vent length 1190 mm, tail length 360 mm.

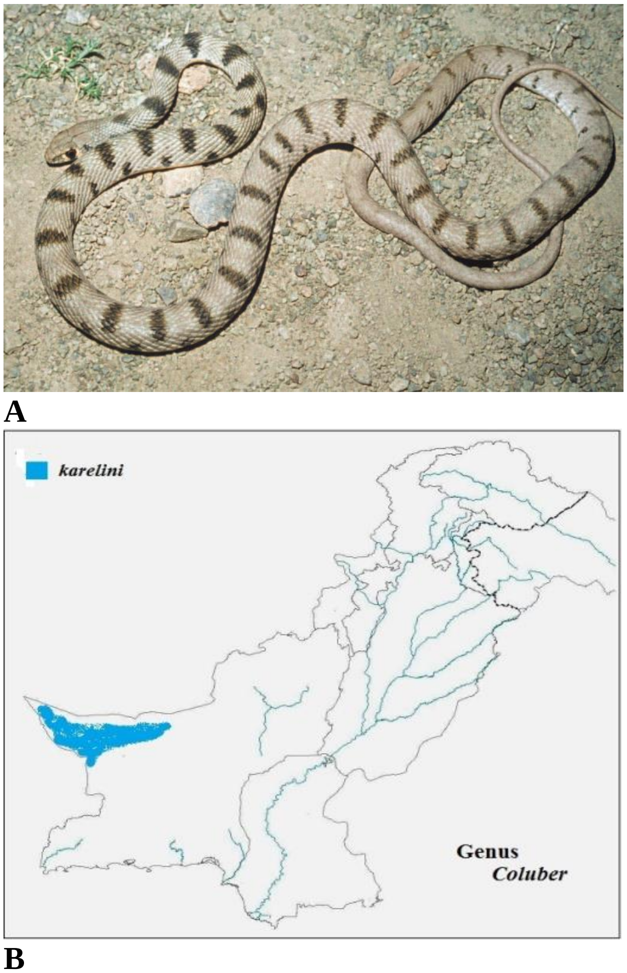


**Fig.10.10.** *Coluber karelini mintonorum* Mertens.

*Color*:
Body with closely set diluted transverse bands, broader than interspaces. Scales in the bands with peripheral deposition of pigment.

*Habitat*:
The snake is true racer, very agile on sand.

**Taxonomic notes**
Mertens (1969a) described a new taxon *Coluber karelini mintonorum* from Zangi-Nawar, 27 km southwest Nushki, District Chagai, Balochistan, with only fifth supralabial in eye, ventrals 192-220, subcaudals 114-123 and body dorsum with close set diluted transverse bands, broader than interspaces, and scales in the bands with peripheral deposition of pigment. Khan (1997a) regards *Coluber karelini mintonorum* conspecific with *Platyceps rhodorachis* and remarks *"Often Coluber rhodorachis* is confused with *Coluber karelini* due to occasional specimens of *rhodorachis* with one supralabial (5th) in orbit and dorsum with alternating light and dark cross bars. Gasperetti gives photographs of similar specimens (1988,) from Afghanistan and Nushki (Balochistan). These specimens neither have dorsal vivid dark pattern nor orbitolabial and temporal stripes as in *Coluber karelini* from Quetta-Peshin, Balochistan". Merten's (1969) *Coluber karelini mintonorum* is a color variant of *Platyceps rhodorachis rhodorachis* and has also been collected from rocky areas in the Sulaiman Range, in the western Punjab, Pakistan (Khan 1997a).

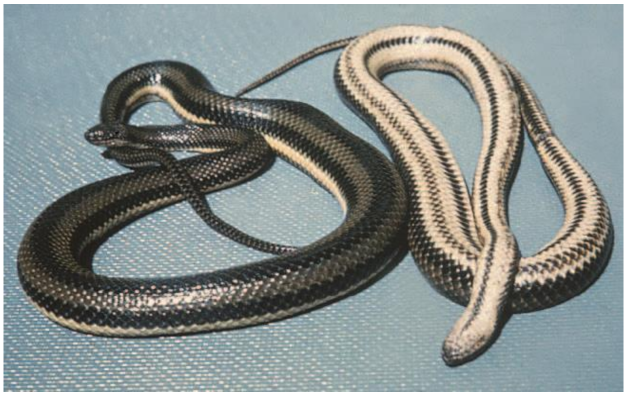
*Range*:
It is reported from sand desert in the Chagai area. The author collected two specimens from the Sulaiman Range, in western Punjab, Pakistan, in a rocky area.

### *9. Enhydris pakistanica* Mertens
(**Fig.10.11**)

1. Body stout, cylindrical, skin loose, scales at midbody 27-31, smooth and glossy.
2. Head small, slightly distinct from neck.
3. A pair of internasals, 1 pre- and 2 postoculars.
4. Supralabials 8, fourth in eye, 11 infralabials.
5. Ventrals small, not extending to full breadth of body, 156-164; subcaudals 75-92; anal 2-3.
   Snout-vent length 500-515 mm, tail 210-215 mm.

*Color*:
Dorsum light olive brown, with 3 black stripes,

median broadest. Ventrum and sides dirty white to yellowish. Head dark, chin and throat white clouded with brown.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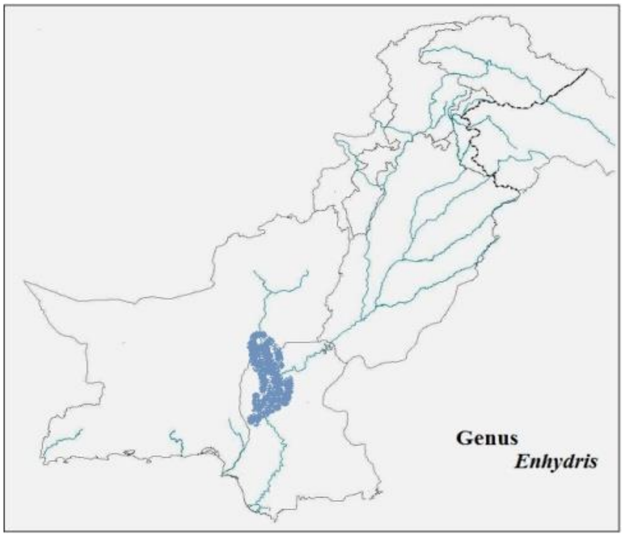


B

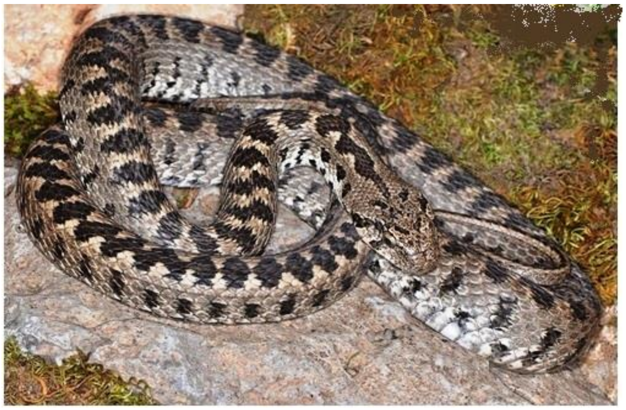
**Fig.10.11.** *Enhydris pakistanica* Mertens. B shows distribution of Genus *Enhydris* in different parts of Pakistan.

*Habitat*:
Frequents seepage pools along water channels. Ponds and ditches so formed are rich with emergent vegetation. This snake is almost entirely aquatic, not known to venture away from water.

*Range*:
Reported only from the Indus Delta in lower Sindh, Pakistan.

### ***10. Hemorrhois ravergieri*** Ménétriés (**Fig.10.12**)

1. Supralabials 9, fifth and sixth touching eye.
2. Anterior and posterior temporals both 3.
3. Scales at midbody 21, reduced to 15 just anterior of vent.
4. Ventrals 205-212, subcaudals 82-89. Snout-vent length 990-995 mm, tail 195-198 mm.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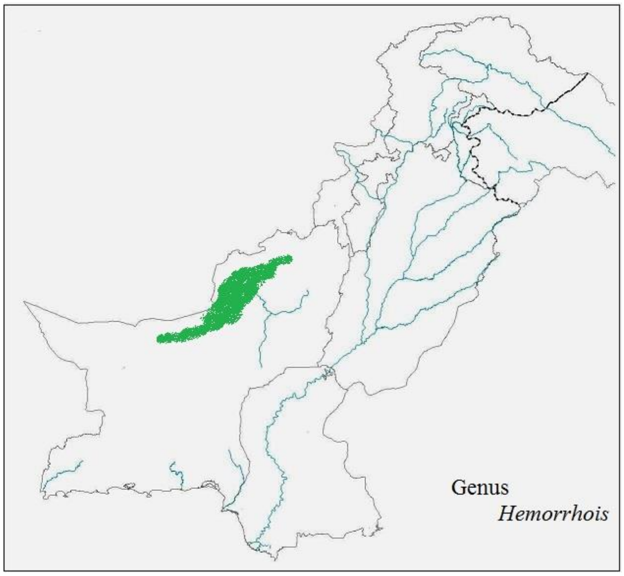


B

**Fig.10.12.** *Hemorrhois ravergieri* Ménétriés. B shows distribution of Genus *Hemorrhois* in different parts of Pakistan.

*Color*:

Dorsum light gray brown, with 61 olive vertebral transverse bars, alternating with lateral row of similarly colored spots, both tending to fuse at tail. Head with indistinct dark mottling, a dark bar from below eye to edge of mouth. Belly pale yellow to dirty white.

*Habitat*:
Inhabits sparsely forested rocky hillsides at 2000-4000 m of elevation. Diurnal, it feeds on lizards, eggs, amphibians, and mice.

*Range*: Extends from Transcaucasia to Israel to western Mongolia. In Pakistan it is recorded from mountainous areas in northern Balochistan to Chitral.

### 11. *Lycodon aulicus aulicus* (Linnaeus) (Fig.10.13)

1. Head depressed, snout spatulate, projecting beyond lower jaw.
2. Loreal elongated, in contact with internasals, not with eye.
3. Supralabials 10, third to fifth in contact with eye.
4. Smooth shiny scales, at midbody in 17 rows.
5. Ventrals 171-214, laterally angulate, subcaudals 55-83, anal divided.
   Snout-vent length 780-785 mm, tail 143-148 mm.

*Color*:
Dark brown to grayish brown dorsum, with slight gloss. Light crossbars 10-20, expanding laterally, and enclosing triangular patches of original body color. Jet black slightly protruding eye, pupil invisible. Upper lip and ventrum white.

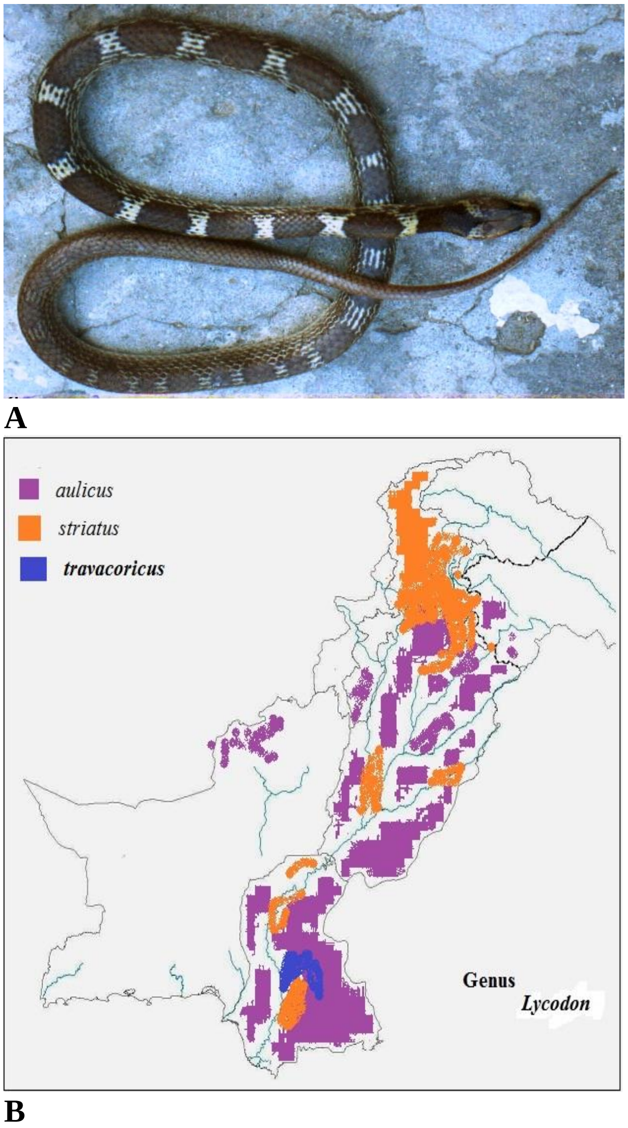


**Fig.10.13.** *Lycodon aulicus aulicus* (Linnaeus**)**. B shows distribution of Genus *Lycodon* in different parts of Pakistan.

*Habitat*: Collected from under piles of broken bricks partially covered with soil and debris. It frequents bush forests with mesic to dry environs and often enters human habitations, hiding under household articles.

*Range*: Widely distributed throughout India, Sri Lanka, Nepal, Assam, and Myanmar. In Pakistan it has rather spotty Range, reported from different localities in Sindh, Lahore and Rabwah, District Jhang, Pakistan.

### *12. Lycodon striatus* (Shaw)
(**Figs.10.14 & 10.13B**)

1. Loreal in contact with internasals.
2. One pre- and 2 postoculars.
3. Supralabials 8-9, fourth and fifth in eye; infralabials 9-10.
4. Scales smooth in 17 midbody rows.
5. Ventrals 173-205; subcaudals 40-60. Snout-vent length 400-405 mm, tail 90-95 mm.

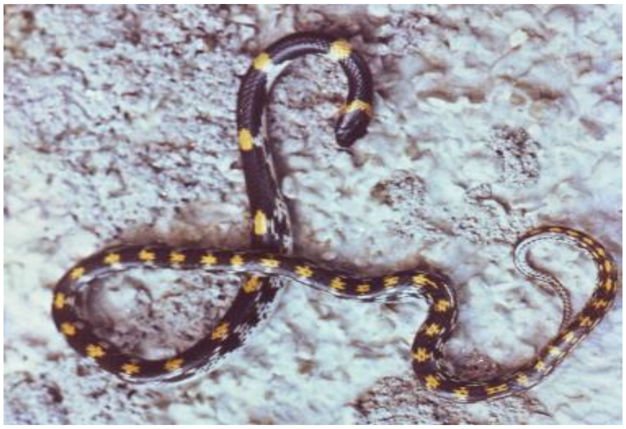


**Fig.10.14.** *Lycodon striatus* (Shaw)

*Color*:
Dorsum light dull brown, with 15-23 white or yellow crossbars from nape to the base of tail, alternating with similarly colored spots or dashes. Nape dark, ventrum white.

*Habitat*:
Collected from both cultivated land and open fields with sparse bushes in mesic habitat.

*Range*:
It ranges from Chota Nagpur in the east throughout India and Sri Lanka. In Pakistan it is collected from different localities in Punjab, Sindh, Balochistan, and Khyber Pakhtunkhwa. Extends westward to Transcaspia and Central Asia. In Pakistan its two races are distinguished as follows:

*Race 1*:
***Lycodon striatus striatus*** (Shaw)

Dorsum black to light chocolate brown with 16-21 light crossbars.

1. Subcaudals 45-60.

*Range***:**
Mainly the Indus Valley and along the coastal strip**.**

*Race 2*:

### *13. Lycodon striatus bicolor* (Nikolsky)
(**Fig.10.15**)

1. A distinct light band on nape.
2. Golden yellow (light in preserved specimens) transverse bars 35 or more, from nape to level of vent.
3. Subcaudals 50-70.

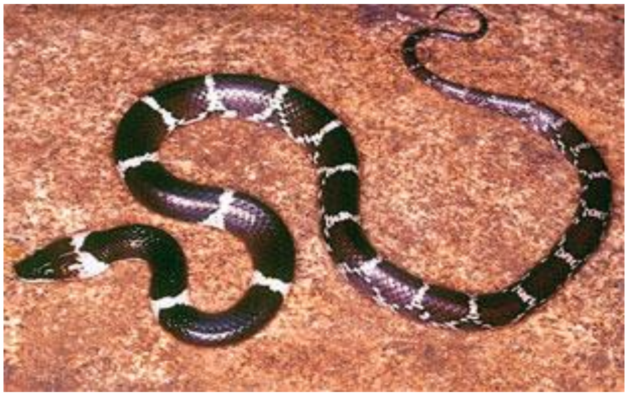


**Fig.10.15.** *Lycodon striatus bicolor* (Nikolsky)

*Range***:**
It occupies northwestern part of the range of the species, extending into Pakistan from upland Balochistan and Waziristan, Khyber Pakhtunkhwa.

### *14. Lycodon travancoricus* (Beddome)
(**Fig.10.16 & 10.13B**)

1. Head distinct from neck.
2. Loreal not in contact with internasals and eye.

3. Supralabials 9, third to fifth in eye in eye.
4. Scales smooth, 17 at midbody.
5. Ventrals laterally angulate, 162-206; subcaudals 64-78, anal not divided.
   Snout-vent length 630 mm, tail 130 mm.

*Color*:
Dark purplish dorsum, with a median row of 28-32 yellow crossbars from nape to level of vent. Bars bifurcate on sides enclosing triangular spots of body color. Ventrum white.

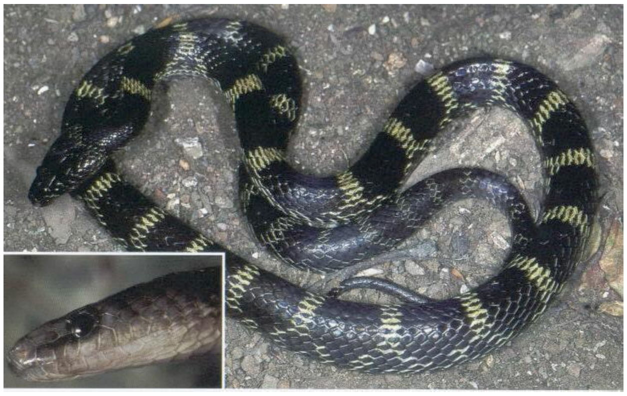


**Fig.10.16.** *Lycodon travancoricus* (Beddome)

*Habitat*:
Reported from the garden of Hyderabad College, Sindh. Nothing is known of its habitat and habit in Pakistan.

*Range*: From southern India. In Pakistan it has been reported once from Hyderabad, Sindh.

### *15. **Lytorhynchus maynardi*** Alcock and Finn (**Fig.10.17**)

1. Head long, slightly distinct from neck, snout sharply pointed.
2. Scales smooth, at midbody 19.
3. Rostral extends on top of head, separating internasals from each other almost completely.
4. Loreal present.
5. Eyes large, bordered by 7-8 circumocular scales, no supralabial in contact with eye, pupil round.
6. Supralabials normally 7, occasionally 6 or 8; infralabials 9-11.
7. Mental with a small anterior projection fitting into a notch at the base of rostral.

8. Ventrals 186-202, subcaudals 52-65.
   Snout-vent length 200-205 mm, tail 56-60 mm.

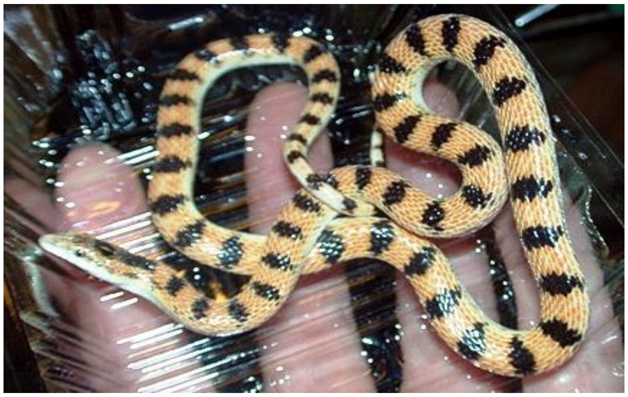


**Fig.10.17.** *Lytorhynchus maynardi* Alcock and Finn.

*Color*:
Dorsum pale orange to pinkish, with 35-47 black crossbars on body and 12-15 on tail. There is an alternating lateral series of dark spots. A characteristic elongated thick dark median stripe from frontal to nape. A dark postocular stripe. Ventrum white.

*Habitat*:
This sand snake has been collected from fine windblown sand dunes. It burrows in sand with the help of its pointed snout, usually close to roots of bushes and other vegetation. It is nocturnal, feeding on small lizards and arthropods; the prey is constricted. It is bad tempered and does not easily allow handling; it coils defensively, setting its neck in an S-shaped loop, attacks rapidly, all the while vibrating its tail (Minton 1966).
It breeds from March to May; 2-4 elongated eggs are laid.

*Range*:
This is a characteristic snake of windblown sand dune habitat of western Balochistan. It has been recorded from Nushki to eastern Iran in the west.

### *16. Lytorhynchus paradoxus* (Günther)
(**Figs.10.18 & 10.17B**)

Morphologically close to the preceding species, differing from it in the following characters:

1. Snout less projecting.
2. Supralabials 8, fifth touching eye; 10-11 infralabials.
3. Ventrals 169-185, subcaudals 40-53; anal divided.
   Snout-vent length 360-375 mm, tail 63-67 mm.

*Color*:
Dorsum brownish gray, with a median series of 40-52 brown to sooty blotches, as broad as or broader than interspaces, alternating with a lateral series of smaller spots. Head top with an elongated dark blotch and a dark postocular stripe, ventrum white.

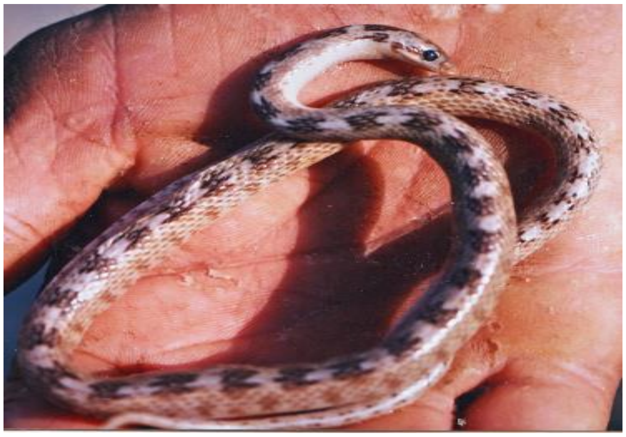


**Fig.10.18.** *Lytorhynchus paradoxus* (Günther)

*Habitat*:
The nominal species frequents sand deserts with sparse vegetation of grass and bushes. Feeding on small lizards, young mice, and arthropods. When alarmed, it throws itself into a ball, hiding its head and vibrating its tail and does not attempt to bite. Sensing that it is out of danger, it quickly dives into sandy soil, making its way by its projecting snout.
It breeds from March to May; 2-4 elongated eggs are laid in burrows at roots of bushes or under a stone.

*Range*: This sand snake extends from the Thar Cholistan, deserts and Thal Deserts in northwestern Punjab, Pakistan (Khan, 1999e).

### *17. Lytorhynchus ridgewayi* Boulenger
(**Figs.10.19 & 10.17B**)

1. Snout long, sharply pointed.
2. Rostral extends onto head, almost completely separating internasals from each other.
3. A circumocular ring of 7-8 scales.
4. Supralabials 7-8, none in contact with eye.
5. Ventrals 170-190, subcaudals 40-55.
   Snout-vent length 505-510 mm, tail 80-87mm.

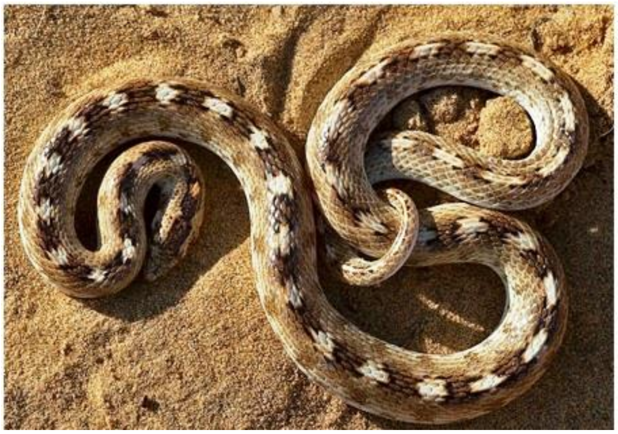


**Fig.10.19.** *Lytorhynchus ridgewayi* Boulenger

*Color*:
Pale gray to light brown dorsum, with a median

series of 40-49 blotches, which are anteriorly black to dark brown and posteriorly light brown with dark edges. A pair of lateral series of light brown spots. Head top with dark anchor-shaped mark, arms of which extend through eye to the angle of mouth. Ventrum of body white.

*Habitat*:
This little snake is characteristic of gravel fields with scrubby vegetation. It avoids open fields of windblown sand dunes, and keeps close to roots of vegetation. It is nocturnal and feeds on small lizards and arthropods; the prey is constricted and violently shaken before engulfing. When disturbed, its first reaction is to dive into soft soil; if on hard soil, it throws itself in coils hiding its head between the coils (Minton, 1966).
It breeds from March to July, 2-4 elongated eggs are laid in a recess in hard soil among roots of vegetation (Andrushko and Mikkau 1964).

*Range*:
This species extends to Transcaspia, central Iran, Afghanistan, and in Pakistan it is reported from western Balochistan up to an elevation of 2000 m.

### ***18. Natrix tessellata*** (Laurenti)

(**Fig.10.20**)

Morphologically close to Xenochrophis *piscator*, however it differs from it as follows:

1. Internasals as long as or longer than broad, triangular, truncate in front.
2. Preoculars 2, rarely 1 or 3, with or without a subocular.
3. Supralabials 8, rarely 7.
4. Dorsal strongly keeled, in 19 midbody rows.
5. Ventrals 160-198, subcaudals 45-87.
   `Snout-vent length 760-768 mm, tail 150-156 mm.

*Color*:
Dorsum light green, olive gray, to almost black, with rows of small square alternating darker spots. Ventrum white, yellow, or orange-red. An inverted V-shaped dark mark on nape.

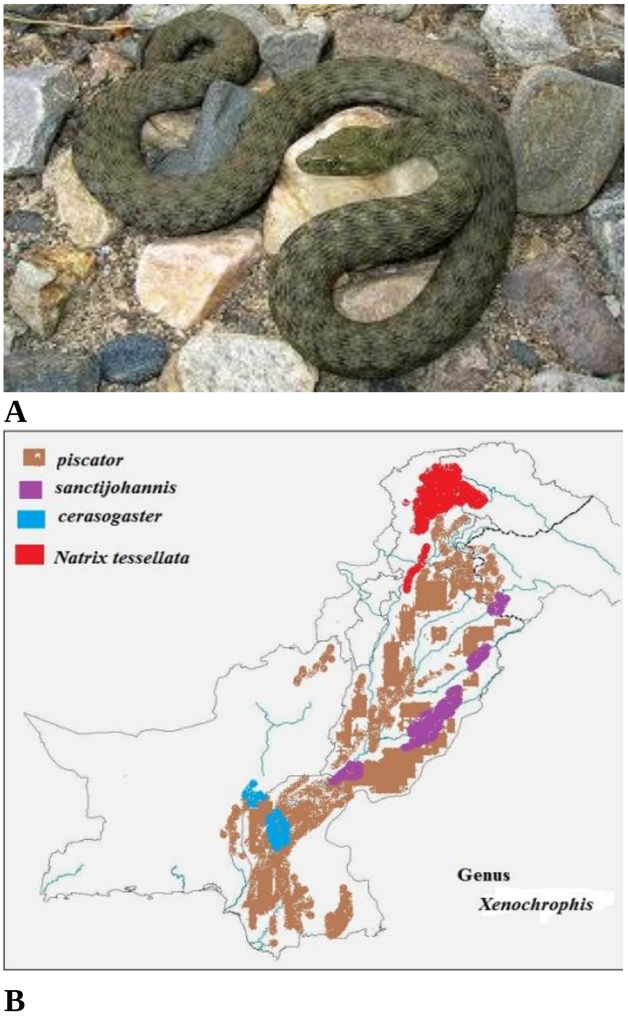


**Fig.10.20.** *Natrix tessellata* (Laurenti). B shows distribution of Genus *Xenochrophis* and *Natrix* in different parts of Pakistan.

*Habitat*:
Inhabits water bodies, feeding on fishes and amphibians.

*Range*:
This snake is widely distributed in central and southeastern Europe to Western Asia, as far as Turkey, across southwestern Asia to Pakistan. It

has been reported from Iraq, Syria, and Jordan to the Nile Delta in Egypt.

### *19. Oligodon arnensis arnensis* (Shaw)
(**Fig.10.21**)

1. Head indistinct, snout blunt.
2. Rostral large, extends well on top of head, almost separating internasals.
3. Loreal may be present or absent.
4. One preocular, 2-3 postoculars.
5. Supralabials 7, third and fourth touching eye; 7 or 8 lower labials.
6. Anterior genial about three times longer than posterior.
7. Body scales smooth glossy, 17 at midbody.
8. Ventrals 175-195, subcaudals 48-57; anal divided.
   Snout-vent length 640-643 mm, tail 98-102 mm.

*Color*:
Dorsum reddish to dark brown, with 32-42 black crossbars, narrowly edged with white. Nape with a pair of V-shaped marks, extending backward. Ventrum white.

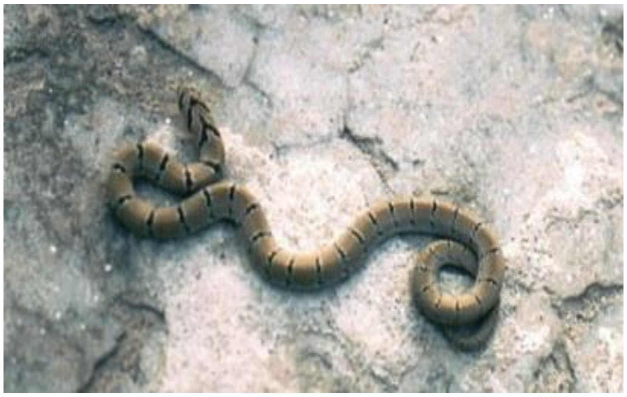


**Fig.10.21.** *Oligodon arnensis arnensis* (Shaw)

*Habitat*:
The brown kukri snake has been collected from mesic to semidesert habitat with bushy to dense forests. It lives in caves, crevices, and tree holes. It is common in hot weather, and is especially quite active at noon; otherwise, it is nocturnal, with a it has special liking for eggs, which it pierces with its specially enlarged posterior pair of upper teeth, the "Kukri" (dagger). The contents of the broken egg are sucked in, and the eggshell is disgorged (Minton and J. A. Anderson 1963; pers. obs.). The snake does not attempt to bite on handling.

It breeds from April to July; 3-8 hard-shelled eggs are laid which are glued to each other in a bunch. Juveniles are seen from June to September (Minton and J. A. Anderson 1963).

*Range*:
The barred kukri snake extends to East Bengal, central Nepal, central and peninsular India, and Sri Lanka. In Pakistan it has been reported from Sindh, throughout Punjab and southern Khyber Pakhtunkhwa.

### *20. Oligodon taeniolatus taeniolatus* (Jerdon)
(**Fig.10.22**)

1. Loreal present.
2. Scales at midbody in 15 rows.
3. Ventrals 190-218, subcaudals 29-58.
   Snout-vent length 580-590 mm, tail 89-73 mm

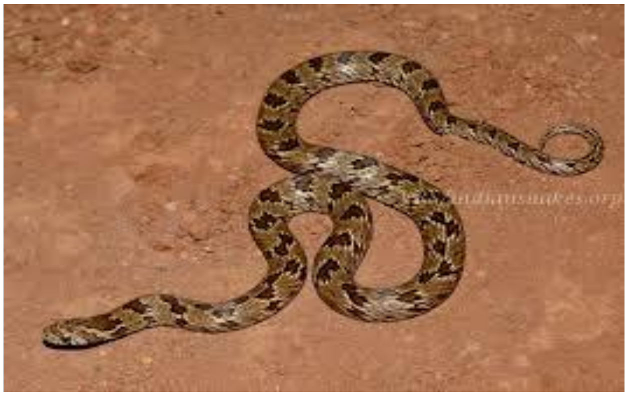


**Fig.10.22.** *Oligodon taeniolatus taeniolatus* (Jerdon)

*Color*:
Dorsum khaki to brown, with 36-47 narrow

irregular dark brown bands edged with white. A narrow vertebral and lateral dark brown stripe. Nape with W-shaped dark collar. A dark band across head at level of eyes. Ventrum white.

*Habitat*:

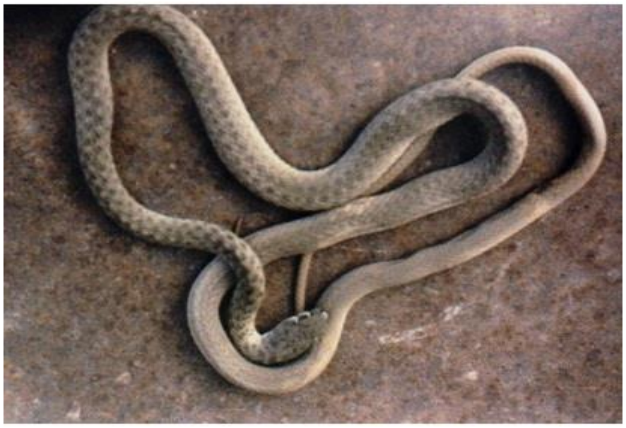
This snake has been collected from flat clay deserts, oases, and suburban gardens to elevations of about 200 m. It lives in crevices and holes in the earth, under stones and rocks, or in brick walls. It hides under piles of wood and trash in gardens. It is nocturnal; in hot weather it moves about just after sunset until dawn. When cornered it flattens against the substratum and puts its tail in a spiral.

This snake feeds primarily on the eggs of lizards and snakes, even its own eggs. Larger eggs are punctured with the help of posterior dagger-shaped enlarged teeth which are brought into play by lateral kinking movements of the head and neck. The punctured egg is either collapsed so that its swallowing is facilitated, or the snake gains entry to consume its contents by thrusting its head into it. Smaller eggs are engulfed whole (Minton and J.A. Anderson 1963). Except for small lizards and arthropods, no other animal is taken. It breeds from March to August; 4-8 hard-shelled eggs glued in a bunch are laid in some secluded place.

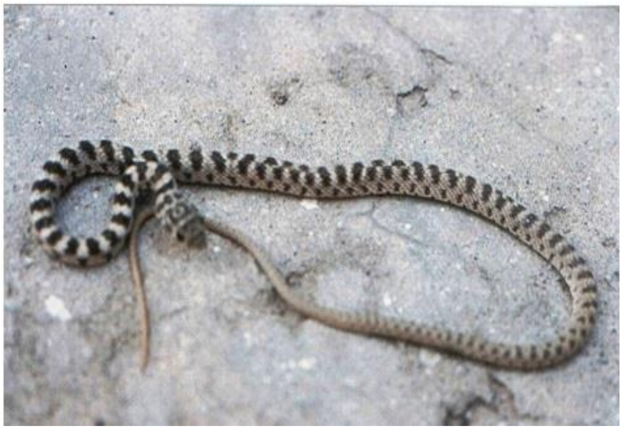
*Range*: The streaked kukri snake has been recorded from Bihar, throughout India and Sri Lanka. In Pakistan it has been recorded throughout the plains from Rawalpindi to Las Bela, at low altitudes (Khan 1993a).

### ***21. Platyceps rhodorachis*** (Jan)
### (**Fig.10.23**)

1. Body slender, head distinct.
2. Supralabials 9, rarely 8, fifth and sixth in eye; infralabials 9 or 10, rarely 11.
3. Ventrals 206-220, subcaudals 125-140.
   Snout-vent length 947-1055 mm, tail 164-170 mm.



Adult



Juvenile

**Fig.10.23.** *Platyceps rhodorachis* (Jan)

*Color*:

Dorsum pale to dark gray, with brownish short median cross bars formed of 4 rows of alternating roundish spots, posteriorly unicolor. Head brownish, with lighter pre- and postoculars. Ventrum white, with dark speckling on lateral sides.

*Habitat*:

The cliff racer prefers stony highland, with sparse grass and bushes, and extends from sea level to 350-3000 m of elevation. It inhabits holes and narrow crevices among rocks, or burrows of rodents and lizards.

*Range*:
Wide range in the west, from Turkmenistan, Syria, Iraq, Iran, Saudi Arabia, and extends to Somalia. In Pakistan it is recorded from Balochistan, and is common around Karachi (Minton 1966). However, it does not extend in plains of Punjab.

### ***Platyceps rhodorachis ladacensis***
(J. Anderson)
(**Fig.10.23**)

1. A typical *rhodorachis* with a red middorsal line.

**Taxonomic notes**
Unaware of Jan's (1865) description, Anderson (1871) described Zamenis *ladacensis* from Ladakh, Baltistan. Later, he (1895) compared *rhodorachis* with ladacensis and found them identical. Despite proven conspecificity, a *rhodorachis* with a pinkish red median dorsal (Nikolsky, 1916), drab, light orange to vermilion (Minton 1966), red (Mertens, 1969a) vertebral line is regarded as *ladacensis*. The "colored vertebral line" is discernible only in a living snake; it is soon lost upon preservation and the identity of taxa is confused. It is why the validity of *ladacensis*, as a separate taxon, has always been questioned (Kramer and Schnurrenberger 1963; Leviton and Anderson 1961; Kral 1969; Ataev 1985; Mertens 1969a). *Platyceps rhodorachis ladacensis* is an alpine race; it has never been collected from Punjab highland. It appears to be simply a color variant, however, I recognize it as a subspecies until more material is available from its type locality.

*Range*:
Minton (pers. comm. 1998) records the uniform gray form of *rhodorachis,* with orange or red vertebral stripe, as common in Quetta (Balochistan) and Peshawar (Khyber Pakhutunkhwa).

### ***Platyceps rhodorachis kashmirensis***
**(**M.S. Khan and A.Q. Khan**)**
(**Fig.10.24**)

Infralabials almost always 10 in number.
1. Dorsals almost always reduced to 13 at vent.
2. Supralabials 9, fifth, sixth in eye, rarely fourth and fifth.
3. Single preocular and presubocular, 2 postoculars.
4. Posterior genials are separated by a patch of 5-8 granular intergenial scales, which are sometime arranged in a double row.
   Ventrals 210-239 mm, subcaudals 119-135.
   Snout-vent length 385-660, tail 190-228 mm.

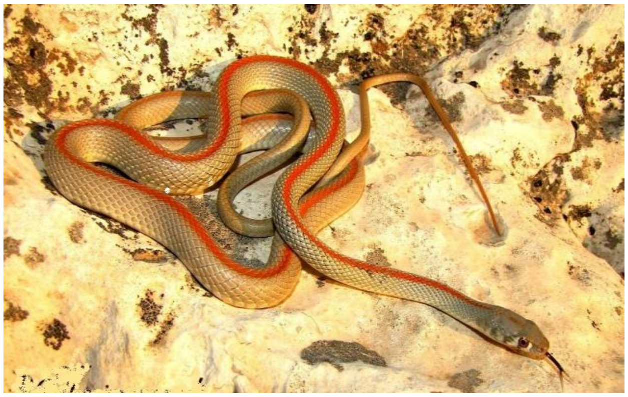


**Fig.10.24.** *Platyceps rhodorachis kashmirensis*

*Color*:
Head and anterior half of the body dark without light spotting, except a pre- and postorbital bar. On the side of neck a series of 2-4 roundish dark spots with white ocelli. Posterior half of the body lighter with irregular dark dashes formed by the black pigment deposited between scales. Ventrum dark, pigment especially deposited between ventrals.

*Habitat*:
It lives in submountainous stony habitats with hard reddish soil, cut into ravines and gullies.

Alpine vegetation consists of grasses, pine trees, and hedges.
The snake was collected from under stones and slabs. It forages around, feeding mostly on skinks and other lizards. It usually climbs in trees and thatched roofs to feed on eggs and nestlings.

*Range*:
Southern Azad Kashmir, Mirpur, Bhimbar, Dulliah Jattan, Kotli, Goi Madan, Aram Bari, Palandri, Punch, Bagh, and Muzaffarabad.

### *Platyceps ventromaculatus ventromaculatus*
**(**Gray and Hardwicke**)**
(**Fig.10.25**)

1. Body moderately robust, cylindrical with even taper.
2. Supralabials 9, rarely 8, fifth and sixth touching eye; infralabials 9 or 10, rarely 11.
3. Ventrals 195-213, subcaudals 97-115. Snout-vent length 1090-1100 mm, tail 205-212 mm.

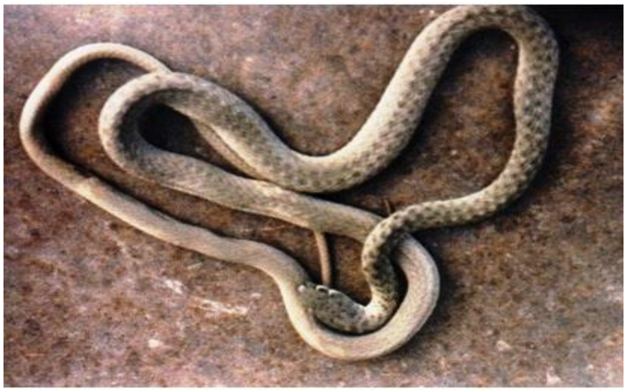


**Fig.10.25.** *Platyceps ventromaculatus ventromaculatus*

*Color*:
Sandy white or light reddish brown, with a median series of 57-76 crossbars formed of gray scales edged with black, alternating with one or two lateral series of spots, the outermost touching tips of ventrals. Dorsal pattern fades out in posterior one-third of body. Head with symmetrical dark mottling on top. Ventrum glistening white.

Two races in Pakistan:

### *Platyceps ventromaculatus bengalensis*
**(**M.S. Khan and **A.**Q. Khan**)**

Supralabials 9, fifth to sixth in eye, 10-11 infralabials. Ventrals 220-230, 69-70 subcaudals. A median dorsal row of 60+, 1-2 scale thick dark cross bands, much narrower than interspaces, replaced on tail by irregular narrow transverse streaks formed by approximation of dark edges of adjacent scales. Distinct orbitolabial and temporal stripes.
A rare snake.

### *24. Platyceps ventromaculatus indusai*
**(**M.S. Khan and A.Q. Khan**)**
(**Fig.10.26**)

Supralabials 8-9, fifth (rare) usually fifth to sixth in eye. Preoculars 2, 2-3 postoculars (rarely 1).

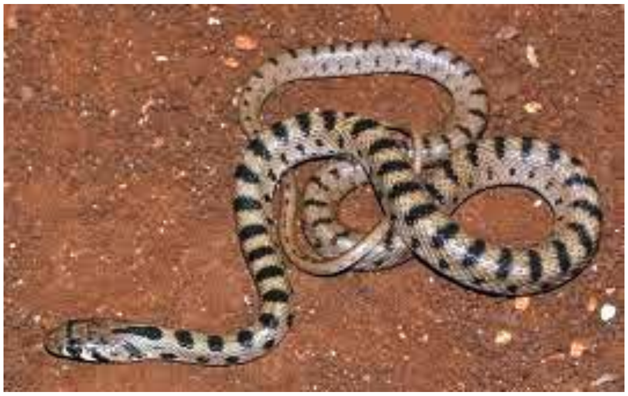


**Fig.10.26.** *Platyceps ventromaculatus indusai*

Ventrals 195-220, subcaudals 82-119.
Dorsum grayish white to pale sandy. Head with

indistinct dark mottling. Body with a median row of 3-4 scale thick 50-70 rhombs or saddles, broader than interspaces, alternating with two lateral rows of spots, outermost row of smaller spots usually touching ventrals. A 2-4 scale thick nuchal streak always flanked by large temporal blotch, which obscures oculotemporal streak. The sooty pigment is confined to scale's periphery.

*Habitat*:
Frequents grasslands, forests with alluvial soil and moderate scrubby vegetation, except humid areas along water courses. Primarily terrestrial, climbs into low bushes and roofs of thatched houses for eggs and nestlings.

*Range*:
Widely distributed in the Indo-Gangetic plains, below 200 m. Extends westward to Uzbekistan and Israel.

### *25. Psammophis condanarus condanarus*
(Merrem)
(**Fig.10.27**)

1. Head long, narrow, distinct from neck, snout blunt, eyes large.
2. Loreal scale elongate, twice long as high.
3. One pre- and 2 postoculars, preocular not in contact with frontal.
4. Nasal incompletely divided.
5. Supralabials 8-9, fourth and fifth in eye; infralabials 11.
6. Midbody scales 17.
7. Ventrals 165-179, subcaudals 83-93; anal divided.
   Snout-vent length 800-825 mm, tail 254-258 mm.

*Color*:
Dorsum pale olive to yellowish. A pair of dark brown stripes on fifth and sixth scale rows does not extend to head. Reddish brown stripes on l-3 scale rows, extends on head passing through eye and snout. Lateral interstripe space cream to straw yellow. Supralabials greenish, green color extends posteriorly as a band on lateral tips of ventrals, ventrum medially cream, margined with a narrow reddish brown stripe.

*Habitat*:
Frequents mesic habitat with long grass and sparse bushes. Diurnal, very agile, and moves very fast. In danger, it freezes and its light color makes it inconspicuous in dry yellow grass in daylight. Climbs into bushes and smaller trees.

*Range***:**
Known from western Bengal, Orissa to Bombay, Sindh, and Punjab. Pakistan records are from Jacobabad, Lahore, and the Indus Delta. In the western Himalayas it is one of the commonest snakes at altitudes between 1000 and 2000 m.

### *26. Psammophis leithii leithii*
(**Fig.10.27**)

1. Preorbital contacts frontal.
2. Temporals 1 + 2.
3. Supralabials 8-9, fourth and fourth in eye; infralabials 9-10.
4. Nasal divided.
5. Posterior genial a little longer than anterior.
6. Ventrals 164-187, subcaudals 104-109; anal not divided.
   Snout-vent length 770-778 mm, tail 225-230 mm.

*Color*:
Ground color yellowish, darker on sides. A pair of dark to brown stripes starting from internasals and continuing along body occupying fifth to seventh scale rows becomes wider at midbody and fusing on tail. The dark lateral color of body forms a stripe, confined on first and second scale row, lateral tips of ventrals white, central part

lemon yellow. Head top with median dark, longitudinal stripe, another stripe through eyes. Labials cream with reddish brown mottling, reddish brown spots on neck.

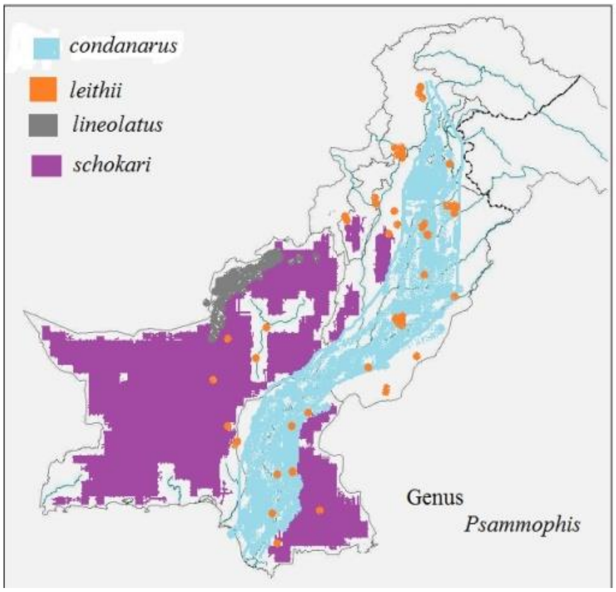


**Fig.10.27.** *Psammophis leithii leithii*

*Habitat*:
Frequents desert grassland with scrubby vegetation near marshy areas in lower Sindh. It extends into clay deserts along the sea coast. Habitats of all the three ribbon snakes of Pakistan overlap in the deserts of Pakistan.
`

*Range***:**
Ranging from the United Provinces of India, Poona to Waziristan and southeastern Balochistan, in the west. In Pakistan it is recorded from Azad Kashmir, the Thar, Cholistan, and Thal Deserts to Kalat District in Balochistan, below 800 m of elevation. It is fairly common in Indus delta.

### *27. Psammophis lineolatus lineolatus* (Brandt)

Steppe ribbon snake: *Patta teer-mar*
(**Fig.10.28 & 10.27**)

1. Preocular touching frontal.
2. Temporals 2 + 2 or 3.
3. Supralabials 9, fourth to sixth touching eye; 9 infralabials.
4. Midbody scale rows 15.
5. Nasal divided.
6. Ventrals 174-190, subcaudals 70-90; anal divided.
   Snout-vent length 875-900 mm, tail 190-194 mm.

*Color*:
Dorsum light grayish buff, a pair of dark stripes from eye running along the length of body. At midbody a medium brown stripe, with several black-tipped scales. Head with a median dark stripe. Labials cream, with reddish brown mottling. Central part of belly lemon yellow, with median stippling and a dark line at lateral tips of ventrals.

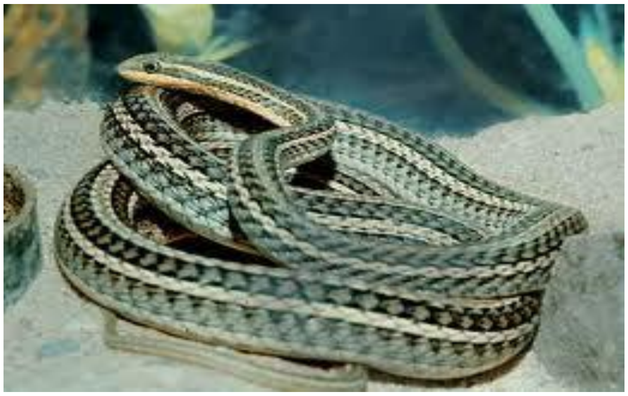


**Fig.10.28.** *Psammophis lineolatus lineolatus* (Brandt)

*Habitat*:
This snake inhabits scrublands in sandy deserts or close to foot hills. Near Quetta it is recorded at 1500-2100 m (Minton 1966).
Food consists mainly of sand lizards and arthropods. It is diurnal, oviparous; 8-10 eggs are laid from March to July, under stones or burrows of rodents and lizards.

*Range*:
It is a central Asian species extending from Transcaspia to northern Iran, east to Mongolia

and northwest China. In Pakistan it has been recorded around Quetta, Balochistan.

### *28. Psammophis schokari schokari* (Forskål)

Saharo-Sindhian ribbon snake: *Saharae teer-mar*)
(**Fig.10.29 & 10.27**)

1. Anterior end of frontal just touching preorbital.
2. Temporals 2 + 2 or 3.
3. Supralabials 9, fifth and sixth in eye; 10 to 11 infralabials.
4. Both genials equal in size and in contact with each other.
5. Midbody scale rows 17.
6. Ventrals 173-186, subcaudals 118-130; anal divided.
   Snout-vent length 1285-1290 mm, tail 460-465 mm.

*Color*:

Color of this snake is very variable: dorsum light olive, chestnut, dark brown, or gray. Head top with symmetrical dark markings; a dark stripe from snout through eye; labials white, flecked and spotted black; central part of belly usually bluish gray, occasionally reddish or almost black.

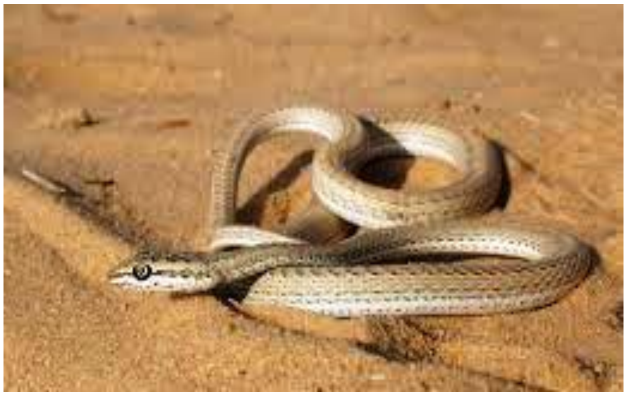


**Fig.10.29.** *Psammophis schokari schokari* (Forskål)

*Habitat*:

This snake inhabits sand deserts with sparse grass and occasional bushes. It lives in lizard or rodent burrows at the roots of bushes or under rocks. It climbs in branches of bushes to bask in the sun, or to avoid heat during the hottest hours.

It is a diurnal, alert, speedy, and very agile snake, and to capture one uninjured is difficult. It feeds on various species of sand lizards and rodents. It breeds from March to July; 4-10 eggs are laid in burrows.

*Range*:

Geographical range of *P. schokari* is continuous across northern Africa through Somalia, through southwestern Asia to Soviet Central Asia, Balochistan, and Sindh (Marx 1988). It extends in Cholistan and Thal Deserts of Punjab, Pakistan (Khan 1987).

### *29. Pseudocyclophis persicus* (J. Anderson)

(**Fig.10.30**)

1. Head long slightly distinct from neck, body slender.
2. Loreal scale generally absent, if present very small.
3. Eyes small, round pupil, not distinct in life.
4. Single pre- and postocular.
5. Supralabials, third and fourth in eye; 7-8 infralabials (Figure 27C).
6. Dorsals smooth, 13-17 at midbody, with apical pits.
7. Ventrals 206-238, subcaudals 75-99.
   Snout-vent length 380-390 mm, tail 107-110 mm.

*Color*:

Dorsum light brown, scales at base dark. Sometimes unicolor or with a neural series of 50-65 narrow transverse dark bars which become broader and fainter posteriorly. Head uniformly gray to dark from snout to nape, with a postorbital light transverse band, another crossing tips of parietals, ventrum cream.

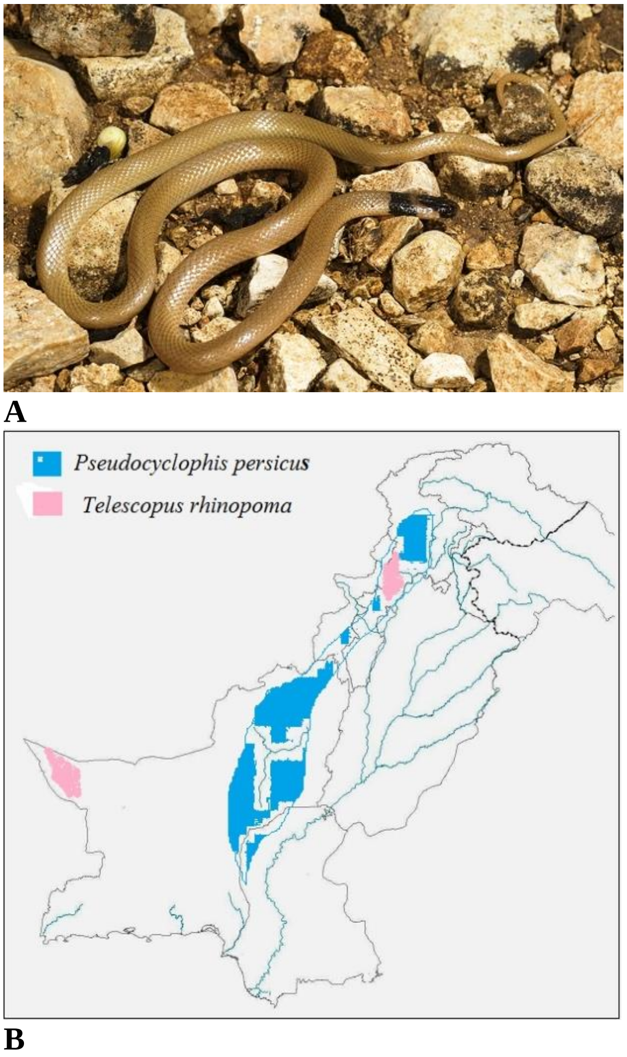


**Fig.10.30.** *Pseudocyclophis persicus* (J. Anderson)

*Habitat*:
The dwarf racer frequents rocky and hilly terrain with xeric to mesic environments with scrubby to forest vegetation. It is very agile retreats into crevices among rocks, and is nocturnal. It is found usually hiding under stones and rocks during the day.
Food includes small lizards, while arthropods are frequently taken. It breeds from April to June; 4-8 oblong eggs are laid in crevices.

*Range*:
The dwarf racer has been reported from Turkmenistan, Iraq, and Iran. In Pakistan it is reported from Balochistan, western Sindh to Swat in the north.

### ***30. Ptyas mucosus mucosus*** (Linnaeus
(**Fig.10.31**)

1. Large snake with elongated head, distinct from neck, snout blunt.
2. Loreal concave, loreal 2-4, usually 3.
3. Preoculars 2 and 2-3 postoculars (Figure 27A).
4. Nostril between nasals and first supralabial; internasals shorter than prefrontals.
5. Supralabials 8, fourth and fifth touching eye, 9 or 10 infralabials.
6. Temporals 2 + 2.
7. Median rows of dorsals distinctly keeled, 17 rarely 19 at midbody.
8. Ventrals 190-197, subcaudals 110-117, anal divided.
   Snout-vent length 2250-2260 mm, tail 550-560 mm.

*Color*:
Dorsum gray to dark olive brown. Edges of most of the scales of body light, dark, or yellowish. Labials and scales of lateral sides of body dark-edged. Belly yellowish white, free edges of ventrals and subcaudals dark.

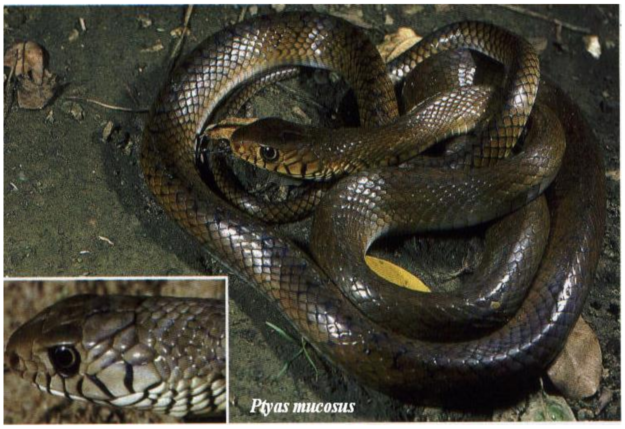


**Fig.10.31.** *Ptyas mucosus mucosus* (Linnaeus

*Habitat*:

The dhaman snake frequents damp and marshy situations along water courses, grasslands, cultivated land, gardens, mango groves, forests, mesic hilly environs, etc. It is attracted into human settlements by the rodent population. It often invades houses and lives in rodent holes. Its loud and resonant hiss is sufficient to chill the hearts of inhabitants. Due to its large size and dorsal body color, it is generally mistaken for *Naja naja*. It is a good swimmer, and climbs into branches of trees and roofs of thatched houses, attracted to bird's nests. Occasionally its presence is indicated by flocks of calling birds. It is a diurnal, alert, and active large snake; when on the prowl, it moves about in search of food. When cornered, its first priority is to slip away, however, if cornered it coils its body and hisses loudly, lunging furiously emitting a loud growling hiss (Abdulali 1935). Its bite is painful but nonvenomous.

Wall (1906) describes its feeding habits, "The dhaman is very catholic in its taste, devouring almost anything that chance brings within its reach, but it displays a very marked partiality to a batrachian diet, doubtless because toads, and more especially frogs, are extremely plentiful, easily captured, and too defenseless to offer much resistance. The possibility of taste influencing its selection may be dismissed, since flesh, however toothsome, must fail to impart its relish when clothed in feathers, fur, or integuments". Diet of the dhaman consists mainly of lizards, birds, eggs, rodents, and frogs. Wall (1906) includes a young soft-shell turtle (*Aspideretes*) in its diet. Its voracity is recorded by the same author by quoting examples of a specimen who that have consumed 18-22 full sized *Euphlyctis cyanophlyctis*. The snake is known to press the struggling prey against the ground with its body while devouring it (Wall 1906). It is known to be cannibalistic and ophiophagus.

It is not killed by the local peoples because it is known to exterminate rats from village houses and barns. In Punjab and Sindh it hibernates from December to February.

The dhaman breeds from March through August. During August and September 8-16 oblong eggs (50 x 40 mm) are laid in burrows, or under some protected shelter which gets sufficiently warmed by the sun to keep the eggs at an optimum temperature. Juveniles hatch between September and December, and are very secretive and alert (Daniel 1983).

*Range*:

The range of dhaman is quite extensive in Southeast Asia; from Java, Sumatra, Viet Nam, and China, it extends throughout India, the Andaman Islands, Sri Lanka, Pakistan, Iran, and Afghanistan. It particularly avoids deserts throughout its range. It is common at moderate elevations of 200 m; however, it has been recoded about 1600 m of elevation near Quetta (Minton pers. comm. 1983).

### *31. Sibynophis sagittarius* (Cantor)

(Golden snake: *Sunahra saamp*)

(**Fig.10.32**)

1. Supralabials 7-8, third and fourth or third to fifth in eye.
2. Single anterior temporal touching fifth, sixth, and seventh supralabial.

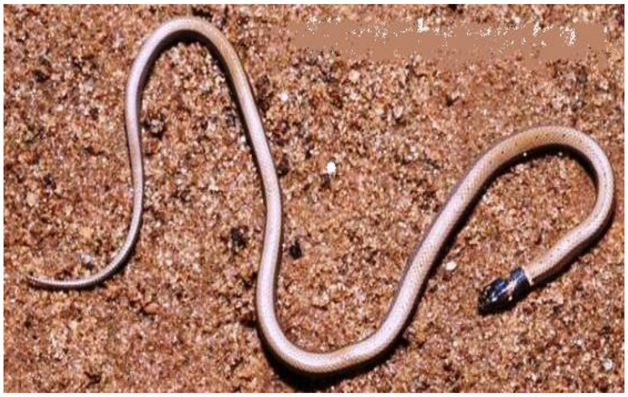


**Fig.10.32.** *Sibynophis sagittarius* (Cantor)

3. Ventrals 197-238; subcaudals 54-70.
4. Total length 350 mm, tail 93-112 mm.

*Color*:

Dorsum light brown. A vertebral series of black dots. Head and nape dark brown or black, with a large elongated oval yellow patch on each side of the back of the head. Snout variegated with yellow. Ventrum yellow, a dark dot on the outer edge of ventrals.

`

*Habitat*:

The only specimen of this snake was recorded from Dulliah Jattan, southern Azad Kashmir, from under a rocky slab.

The terrain is stony with hard soil. Vegetation is sparse of grasses, with occasional low bushes.

*Range*:

Western Himalayas; Ganges basin, lower Bengal (Mahendra, 1984). It has recently been recorded from southern Azad Kashmir (A. Q. Khan and M. S. Khan 1996).

### ***32. Spalerosophis arenarius*** (Boulenger)
(**Fig.10.33**)

1. Prefrontal broken into 3-6, usually 4 scales, arranged in a transverse series.
2. Snout pointed, rostral extends well on top of snout separating internasals from each other, more than length of suture between them.
3. Loreal 2, one behind other.
4. Scales in circumocular ring 6-8.
5. Supralabials 9-11, infralabials10-12.
6. Scales keeled, 25 rows at midbody.
7. Ventrals 226-257, subcaudals 71-86, anal not divided.
   Snout-vent length 930-935 mm, tail 175-180 mm.

*Color*:

Dorsum grayish to reddish brown, with seven series of alternating reddish spots of various sizes, those of median series largest, 54-72 from nape to the base of tail, where they tend to fuse in longitudinal stripes. Ventrum glossy white.

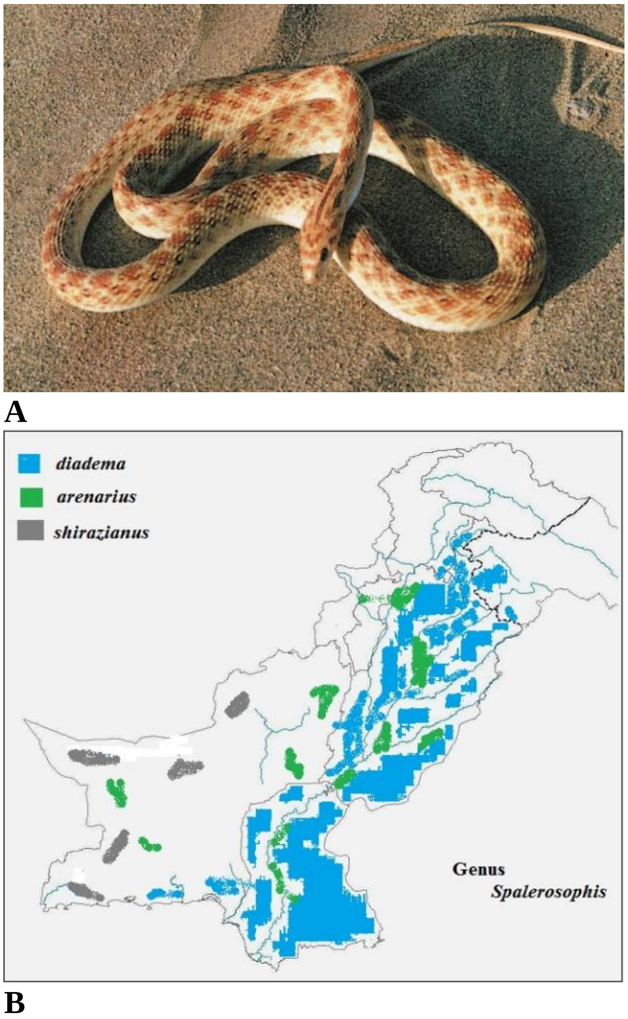


**Fig.10.33.** *Spalerosophis arenarius* (Boulenger). B shows distribution of Genus *Spalerosophis* in different parts of Pakistan.

*Habitat*:

This snake frequents sandy country with scrubby vegetation. It is nocturnal and feeds on various sand lizards, birds, field mice, and eggs. When cornered it hisses loudly and attacks. Wounds inflicted by it are painful.

It climbs into low bushes to feed on eggs and nestlings. It breeds from March to June, 8-10 elongated eggs are laid in some protected place having optimum temperature and humidity.

*Range*:
Apart from Cholistan and the Thar Deserts, it has recently been reported from Dera Ghazi Khan and the Thal Desert in northwestern Punjab, Pakistan (Khan 1999a).

### ***33. Spalerosophis diadema*** **(**Schlegel) (**Fig.10.34**)

1. Loreal two, one behind other.
2. Circumocular ring of 8-10 scales.
3. Prefrontal segmented in 5-8 scales, arranged in two transverse series.
4. Supralabials 10-13, infralabials 11-14.
5. Dorsals keeled, in 27-31 rows at midbody.
6. Ventrals 232-254, subcaudals 96-114, anal not divided.
   Snout-vent length 1220-1230 mm, tail 328-232 mm.

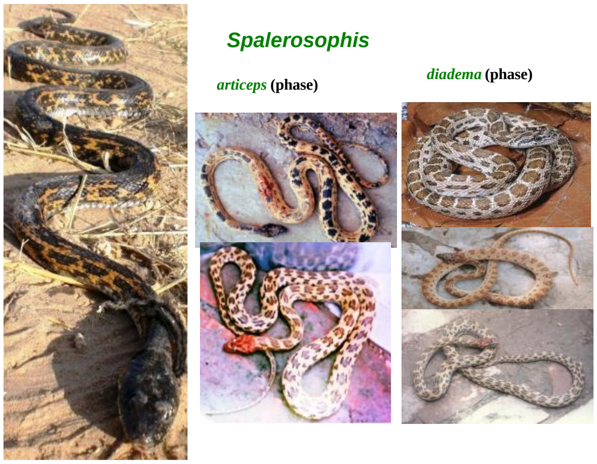


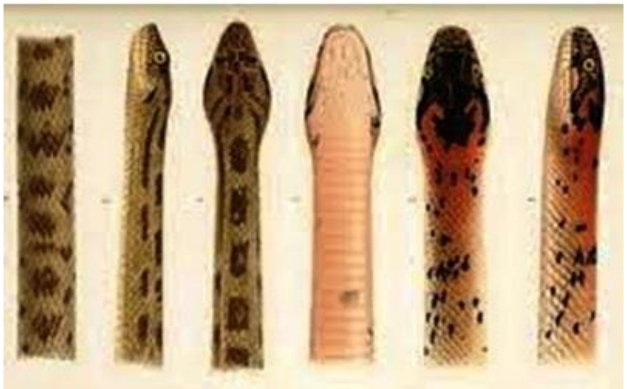
**Fig.10.34.** *Spalerosophis diadema* **(**Schlegel)

*Color*:
Color varies with age: young snakes are thin-bodied with a median row of dark brown large rhomboidal blotches on body, and an alternating lateral series of similar smaller spots. There is a dark bar between eyes, and an oblique stripe from behind the eye to the angle of mouth. Older specimens are thick-bodied, yellow dorsum with scattered dark brown or sooty black spots, usually confined to individual scales. Head either blood red with tinge of black or entirely sooty black. Ventrum deep red, visible through ivory white ventrals. A transitory color phase is observed in subadults. Melanistic adults are not uncommon (Mertens 1969a).

*Habitat*:
This large snake inhabits forests along water courses, and open fields with scrubby vegetation and moderately hard soil. In rocky area it lives in crevices in loose rock. It is the usual snake frequenting old uninhabited buildings with untended natural vegetation. It is often seen in groves, barns, and suburban gardens where it is attracted by rats, mice, and nesting birds. While in inhabited houses, it lives in rat holes and often climbs in roofs to feed on birds and their nestlings. It is a bad tempered snake; when cornered it hisses loudly and strikes repeatedly, biting savagely and inflicting a painful nasty bite.

It is nocturnal, however it is it is occasionally active during the day also. Its natural diet consists of frogs, rats, birds, eggs, and lizards.
It breeds from March to September; 3-12 eggs are laid in more than one clutch, each of 2-6 eggs measuring 68-78 x 16-28 mm.

*Range*:
The diadem snake has been recorded from sea level to 2000 m, in Gilgit, northern Pakistan; however, it is widely distributed throughout India, Bangladesh, and northern Sri Lanka. In Pakistan it has been recorded from throughout Khyber Pakhtunkhwa, Punjab, Sindh, and Balochistan.



***Spalerosophis diadema “atriceps”* phase**
Taxonomic notes:
Differs from *Spalerosophis diadema* in dorsal color and pattern which is highly variable. Dorsum is straw yellow to orange or dusky pink, with irregular black flecks and blotches, head black or red, mottled with red or black, shading to dark red on nape and temples. Belly peach to pink, immaculate or mottled with dark gray, chin and throat white (Minton 1966). However, Mertens (1969) has shown that *Spalerosophis diadema* changes its color and pattern to *atriceps* (Plate 142A) phase, as it grows old.

### *34. Spalerosophis schirazianus* (Jan)
(**Fig.10.35**)

1. Scales in ocular ring 8-10.
2. Prefrontals 6-9.
3. Dorsals smooth or with traces of keels, 25 or 27 at midbody.
4. Ventrals 231-244, subcaudals 78-79; anal not divided.
   Snout-vent length 975-980 mm, tail 195 mm.

*Color*:
Dorsum pale gray, yellowish khaki. A median series of 50-54 light olive to dark gray blotches. Head marking like young *S. diadema*. Ventrum white.

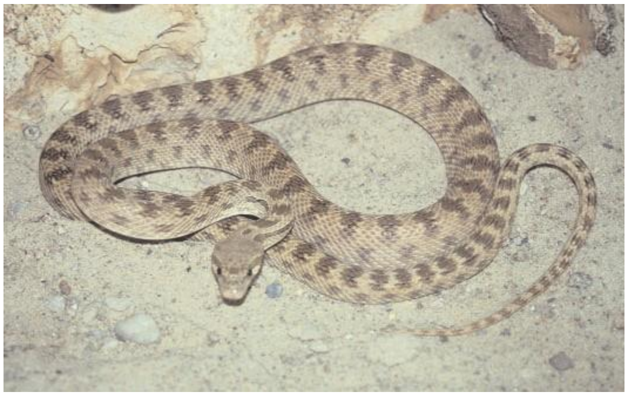


**Fig.10.35.** *Spalerosophis schirazianus* (Jan)

*Habitat*:
The Persian diadem snake frequents flat clay deserts with sparse vegetation. However, it extends into fruit groves hiding under fallen trees, leaf litter, in crevices and holes in the soil. It usually occupies burrows of lizards and field rats. It is primarily a nocturnal species; however, it is occasionally seen active during the day.
Food includes birds, eggs, lizards, and field rats. The snake climbs in low bushes in search of prey.
It breeds from March to August; 4-12 elongated eggs are laid in some protected place with optimum temperature and humidity.

*Range*:
It has wider range in the west, from Transcaspia to the Zagros Mountains in southern Iran and Tajikistan. In Pakistan it is at its easternmost Range range and has been recorded from western Balochistan and Las Bela (Khan, 1987).

### *35. Telescopus rhinopoma* (Blanford)

Desert cat snake: *Regasthani billi-chishm saamp*
1874 Dipsas *rhinopoma* Blanford, Ann. Mag. Nat. Hist. London 13:34.
*Type locality*:
Kirman, southern Iran.

*Diagnosis*:

1. Triangular head, distinct from neck, snout flat, broad.
2. Body cylindrical, slender.
3. Eyes large with vertical pupil.
4. Nostril small, in partially divided nasal, loreal elongate touching eye, single preocular in contact with frontal.
5. Anterior temporals 3, posterior temporals 3-4.
6. Supralabials 8-9, fourth to sixth in eye; 12 infralabials.
7. Dorsals smooth, oblique with apical pits, 23 at midbody reduced to 17 at vent, middorsals broader than laterals.
8. Ventrals 247-280, subcaudals 77-99, anal entire.
   Snout-vent length 830-840 mm, caudal length 160 mm.

*Color*:

Head sandy, with dark Y-shaped mark, stem of which with dark nuchal color. Body dorsum pale grayish, with a middorsal series of large dark brown squarish blotches, broader than interspaces, posteriorly median row of blotches may divide in 2 rows of spots. A lateral alternating series of smaller poorly defined spots. Ventrum dark brown.

*Habitat*:

A rare snake, it is nocturnal, taken from arid rocky hills at an elevation of 700 m. Related species of desert cat snake feed almost entirely on lizards (Minton 1966), and birds (Böhme, 1977).

*Range*:

South-central Iran to Waziristan. Kacha Thana, Balochistan (Wall 1914); Miranshah, Tochi Valley, Waziristan, Khyber Pakhtunkhwa. A specimen BMNH 94.210.4.4. from Sind is in the British Museum, London (Minton 1966). Böhme (1977) puts Sind in comas showing it in the northwestern Balochistan.

### ***36. Xenochrophis cerasogaster cerasogaster***
### (Cantor)

Red-belly marsh snake: *Surakh dhoobi saamp*
(**Fig.10.20B**)

1. Head long, narrow, distinct from neck.
2. A pair of anterior and 3 posterior temporals.
3. Supralabials 8-9, fourth touches eye; infralabials 9-11.
4. Scales at midbody 19, weakly keeled, last 3-4 rows smooth.
5. Ventrals males 140-149, females 144-158; subcaudals paired, males 63-78, females 63-71, anal divided.
   Total length males 577-668 mm, females 924-973 mm.

*Color*:

Dorsum dark brown, olive, or russet, with a dull faint dorsolateral stripe. A bright yellow stripe along outermost scale row and lateral tips of ventrals, extending on to the lips and temporal region. Ventrum posteriorly purplish black, anteriorly becoming gray, heavily marbled with red. Chin and throat white, with red mottling.

*Habitat*:

This water snake avoids main water bodies, and confines itself to shallow quieter, side pools with much emergent vegetation. It often rests on the edge of the water body or on Lily pads. It is met with from late June to late November (Minton 1966).

It is diurnal, shy, quite active in water, and moves about in emergent marginal vegetation in search of fish, which is its main dietary item. It also feeds on shrimps and other water creatures including tadpoles and frogs. When alarmed it slips into deep water. It has a moderate temperament and rarely bites upon handling.

It breeds from March to July; it is ovoviviparous and 20-25 eggs, average size 22 x 12 mm, are laid in early April in shallow holes in moist banks of ponds. They hatch during June and July (Malnate and Minton 1965).

*Range*:
The red-belly water snake ranges widely in the Indo-Gangetic plains, from Assam through Bangladesh, to the Indus Delta. Northward it extends up to Nepal. In Pakistan it is known only from lower Sindh (Khan 1999e).

### ***37. Xenochrophis piscator piscator*** (Schneider) (**Figs.10.36 and 10.20B**)

Checkered keelback: *Chittra dhoobi saamp*

1. Head slightly flattened, distinct from neck.
2. Supralabials 8-10, fourth and fifth in eye; 9-10 infralabials (Figure 28C).
3. Anterior genial tuberculated in adult male.
4. Ventrals 135-152, subcaudals 62-78. Snout-vent length 930-940 mm, tail 175-180 mm.

*Color*:
Dorsum light green-gray or light reddish brown, with 5 rows of blackish blotches, smaller than interspaces, often fused with each other to form a reticulation, more marked in anterior half of body, the pattern fades posteriorly. A pair of dark post-oculo-supralabial bars. Ventrum white or cream.

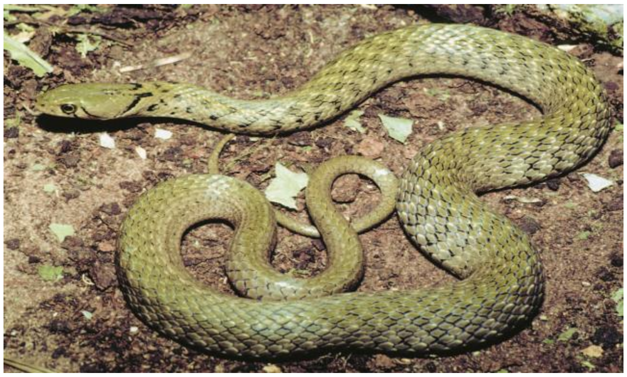


**Fig.10.36.** *Xenochrophis piscator piscator* (Schneider)

*Habitat*:
The checkered keel back is more common in large ponds with thick emergent vegetation; it confines itself mainly to side pools, avoiding the main stream. In winter when most of the water bodies are dry, the helpless snakes are killed in large numbers by people and other animals like mongoose and kites in large numbers. Water-visiting bird are said to take a high toll on young snakes. The snakes that have survived attack usually have broken tails, which are common in this species (Auffenberg 1980b).
The water snake is strong and active, moving briskly on land and in water. It is reported to move in jumps on land (Wall 1907b). It is known to be bad tempered; when cornered it rears up and flattens its body ready to bite. It strikes with great determination and rapidity. It bites viciously, holding on with such tenacity that it is difficult to dislodge. It leaves nasty wounds. During winter it is diurnal, while in summer it becomes crepuscular and nocturnal. It is often seen swimming close to the upper warmer layers of pond in winter and basks on dry ground.
It feeds on fishes, frogs, and tadpoles (Minton 1966; Auffenberg 1980b). The prey is ambushed, with the large teeth of the snake playing an important role in retaining a firm hold on slippery prey and subduing it.
The water snake breeds from February to May; 50-80 eggs are laid in adhering clusters in holes away from water. Eggs measure 27-31 x 15-18 mm in dimension.

*Range*:
This snake has wide Range in Southeast Asia, from Borneo, Taiwan, throughout India, westward to the Indus Delta. It is quite common in all major drainage systems in the upper and lower Indus Valley.

### *38. Xenochrophis sanctijohannis* Boulenger
(**Fig. 10.20B**)

1. A single (fourth) supralabial touching eye.
2. Single pre- and 3 postoculars.
3. Dorsals feebly keeled, outer 4 rows smooth.
4. Ventrals 149-159, subcaudals 85-92.
5. Postoculosupralabial stripes absent, or very feebly indicated.

   Snout-vent length 830-835 mm, tail 273-275 mm.

*Color*:
Dorsum yellowish green without pattern or slight indication of spots on anterior half of body.

*Habitat*:
This water snake was first recorded from a fast-flowing stream in Kashmir; recently it has been collected from irrigation channels from the Sutlej River, in Cholistan, southern Punjab.

*Range*:
Primarily a highland water snake, it is washed down the Sutlej River and finds its way into irrigation channels in areas surrounding Bahawalnagar and Bahawalpur, southern Punjab, Pakistan.

# APPENDIX

## Scientific, common English and Urdu names

---

| **Family Scincidae** | **Skinks** | ***Raig mahi*** | ریگ ماہی |
|---|---|---|---|
| ***Ablepharus grayanus*** (Stoliczka, 1872) | Earless Snake-eyed Skink: | *Boly saamp-chism raig mahi* | بولی ریگ ماہی |

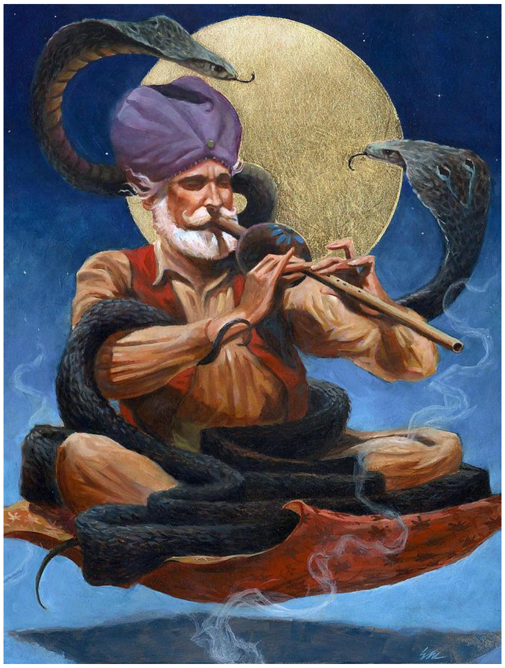
| **Family Colubridae** | ***Coluber*** | ***Koluber*** | کولوبر |
|---|---|---|---|
| ***Amphiesma platyceps*** (Blyth, 1854) | Spotted Keel-back: | *Chitra Khar-pusht* | چتراخارپُشت سانپ |
| ***Amphiesma sieboldii*** (Günther, 1860) | Himalayan Keel-back | *Uttri Khar-pusht* | اُتری خارپُشت سانپ |
| ***Amphiesma stolatum*** (Linnaeus, 1758) | Striped Keel-back | *Patta dar Khar-pusht* | پٹی دار خارپُشت سانپ |
| ***Argyrogena fasciolata*** (Shaw, 1802) | Banded Racer | *Patta dar Taiz-rau* | پٹیدار تیزروسانپ |
| ***Boiga melanocephala*** (Annandale, 1904) | Dark-head Cat Snake | *Siah sar billi-chisham Saamp* | سیاہ سر بلی چشم سانپ |
| ***Boiga trigonata*** (Schneider, 1802) | Brown Cat Snake | *Bhoora Billi-chisham Saamp* | بھورابلی چشم سانپ |
| ***Coluber k. karelini*** Brandt, 1838 | Banded Desert Racer | *Patta-Dar koluber Saamp* | پٹیدار کولوبر سانپ |
| ***Coluber k. mintonorum*** Mertens, 1969 | Minton's Cliff Racer | *Minton ka Pahari saamp* | منٹن کا پہاری سانپ |
| ***Enhydris pakistanica*** Mertens, 1959 | Sindh Ditch Snake | *Sindhi Jheel saamp* | سندھ وادی جھیل سانپ |
| ***Hemorrhois ravergieri*** (Ménétriés, 1832) | Mountain Racer | *Pahari Koluber* | پہاڑی کولوبر سانپ |
| ***Lycodon a. aulicus*** (Linnaeus, 1758) | Common Wolf Snake | *wolf-saamp* | ولف سانپ |
| ***Lycodon striatus bicolor*** (Nikolski, 1903) | Golden Wolf Snake | *Sunahra wolf-saamp* | سنہراولف سانپ |
| ***Lycodon s. striatus*** (Shaw, 1802) | Spotted Wolf Snake | *Chittra wolf-saamp* | چتراولف سانپ |
| ***Lycodon travancoricus*** (Beddome, 1870) | Southern Wolf Snake | *Dakhni wolf-saamp* | دکھنی ولف سانپ |
| ***Lytorhynchus maynardi*** Alcock & Finn, 1896 | Western Awl Head Snake | *Dakhni Crotia-sar samp* | دکھنی کروشیاسر سانپ |
| ***Lytorhynchus paradoxus*** (Günther, 1875) | Sindh Awl Head Snake | *Sindhi crotia-sar samp* | سندھی کروشیاسر سانپ |
| ***Lytorhynchus ridgewayi*** Boulenger, 1887 | Afghan Awl Head Snake | *Afghan crotia-sar* | افغانی کروشیاسر سانپ |
| ***Natrix tessellata*** (Laurenti, 1768) | Blotched Water Snake | *Chitra dhobi-snake* | چترادھوبی سانپ |
| ***Oligodon arnensis*** (Shaw, 1802) | Russet Kukri Snake | *Bhoora kukri saamp* | بھوراککری سانپ |
| ***Oligodon taeniolatus*** (Jerdon, 1853) | Streaked Kukri Snake: | *Dahari-dar kukri saamp* | دھاری دار ککری سانپ |
| ***Platyceps rhodorachis kashmirensis*** (M.S. Khan & A.Q.Khan, 2000) | Kashmir Cliff Racer | *Kashmir koluber* | کشمیری کولوبر سانپ |
| ***Platyceps rhodorachis ladacensis*** (J. Anderson, 1871) | Ladakh Racer | *Ladak koluber* | لدّاخ کولوبر سانپ |
| ***Platyceps rhodorachis rhodorachis*** (Jan, 1865) | Cliff Racer | *Chattani koluber* | چٹانی کولوبر سانپ |
| ***Platyceps ventromaculatus bengalensis*** (M.S.Khan & A.Q.Khan, 2000) | Bengal Racer | *Bengali koluber* | بنگال کولوبر سانپ |
| ***Platyceps ventromaculatus indusai*** (M.S.Khan & A.Q.Khan, 2000) | Sindh Racer | *Sindhi koluber* | سندھ کولوبر سانپ |
| ***Platyceps ventromaculatus ventromaculatus*** (Gray & Hardwicke, 1834) | Indus Valley Racer: | *Maidani koluber* | میدانی کولوبر سانپ |
| ***Psammophis condanarus condanarus*** (Merrem, | Indo-Burmese Sand | *Burma teer-mar* | برمی تیرمار |

| | | | |
|---|---|---|---|
| 1820) | Snake | | |
| ***Psammophis leithii leithii*** Günther, 1869 | Pakistan Ribbon Snake | *Sindhi teer-mar* | سندھی تیر مار |
| ***Psammophis lineolatus lineolatus*** (Brandt, 1838) | Steppe Ribbon Snake | *Dhari-dar teer-mar* | پٹہ دار تیر مار |
| ***Psammophis schokari schokari*** (Forskål, 1775) | Saharo-Sindhian Ribbon Snake | *Saharai teer-mar* | صحرائی تیر مار |
| ***Pseudocyclophis persicus*** (J. Anderson, 1872) | Iran Dwarf Racer: | *Irani podna taiz-rau saamp* | ایرانی تیز رو سانپ |
| ***Ptyas mucosus*** (Linnaeus, 1758) | Rat Snake | *Dahaman* | دھامن سانپ |
| ***Sibynophis sagittarius*** (Cantor, 1839) | Golden Snake | *Sunahra saamp* | سنہرا سانپ |
| ***Spalerosophis arenarius*** (Boulenger, 1890) | Red-spotted Diadem Snake | *Ragistani dabba saamp* | ریگستانی ڈبہ سانپ |
| ***Spalerosophis diadema diadema*** (Schlegel, 1837) | Royal Snake, Diadem Snake | *Surakh dabba saamp* | سرخ ڈبہ سانپ |
| ***Spalerosophis diadema atriceps*** (Fisher, 1885) | Variegated Diadem Snake | *Chatkabra samp* | چتکبرہ سانپ |
| ***Spalerosophis schirazianus*** (Jan, 1865) | Persian Diadem Snake: | *Irani dabba saamp* | ایرانی ڈبہ سانپ |
| ***Telescopus rhinopoma*** (Blanford, 1874) | Desert Cat Snake | *Regasthani billi saamp* | ریگستانی بلی سانپ |
| ***Xenochrophis cerasogaster cerasogaster*** (Cantor, 1839) | Red-belly Marsh Snake | *Surakh dhoobi saamp* | سرخ پیٹ دھوبی سانپ |
| ***Xenochrophis piscator piscator*** (Schneider, 1799**)** | Checkered Keelback: | *Chittra dhoobi saamp* | چتڑا دھوبی سانپ |
| ***Xenochrophis sanctijohannis*** (Boulenger, 1890) | Olive Water Snake | *Zatooni dhoobi saamp* | زیتونی دھوبی سانپ |

# Chapter 11

## Venomous Snakes
## Elapidae, Viperidae, Crotaudae, Hydrophiidae

Family Elapidae ..................................................



Legendry snake charmer

### Family Elapidae

**Key:**

1. Vertebral row of dorsals distinctly enlarged, subcaudals undivided .................2
   Vertebral row not enlarged; subcaudals divided ......................................................3
2. Scales at midbody 15. ..*Bungarus caeruleus*
   Scales at midbody 17 ....*Bungarus sindanus*
3. Dorsum jet black to light black; usually a cuneate scale present ...................*Naja naja*
   Dorsum yellow brown or variegated; the cuneate scale usually absent........ *Naja oxiana*

### *1. Bungarus caeruleus caeruleus* (Schneider) (**Fig.11.1**)

1. Medium sized snakes, head barely distinguishable from neck.
2. Small eyes, round pupil, barely visible in life.
3. Loreal absent, one pre, two postoculars.
4. Temporals 1+2.
5. Supralabials 7, third and fourth in eye; 8 infralabials.
6. Body scales smooth, shiny, in 15 rows at midbody.
7. First transverse light stripe appears between forty-second and forty-third ventral.

8. Ventral 205-217, subcaudals 43-54, undivided.
   Snout-vent length 1120-1125 mm, tail 150-157 mm.

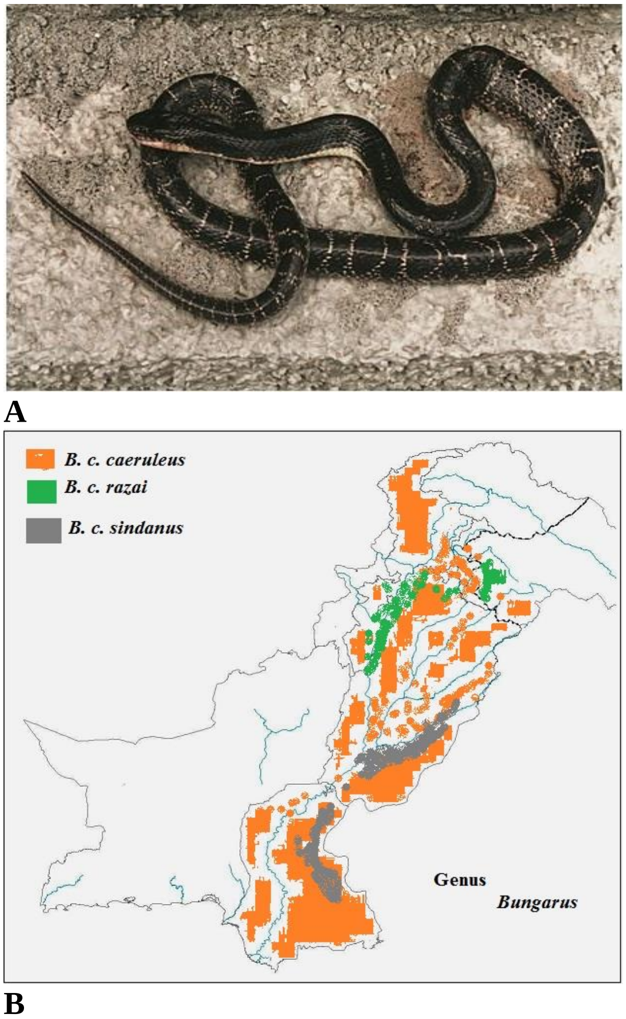


**Fig.11.1.** *Bungarus caeruleus caeruleus* (Schneider). B shows distribution of species of Genus *Bungarus* in different parts of Pakistan.

*Colour*:
Dorsum jet black to deep blue, which upon preservation becomes dark brown. A series of 3-9 light vertebral spots on anterior part of body followed by 38-56 narrow transverse bands, usually in pairs. Supralabials and body ventrum white.

*Habitat*:
Frequents open grasslands, semi-deserts with alluvial soil; marginal vegetation along agricultural land, barns, farms, groves and gardens. Extend in residential areas.

*Range*:
Reported from Bangladesh, throughout India, and northern Sri Lanka, throughout Pakistan.

### 2. *Bungarus sindanus sindanus* Boulenger
**(Fig.11.2 & 11.1B)**

1. Midbody scale rows 17.
2. Ventrals range from 220-237, subcaudals 49-52.
3. First light transverse band appears at the level of eleventh to fifteenth ventrals.
   Snout-vent length 1034-1038 mm, tail 132-137 mm.

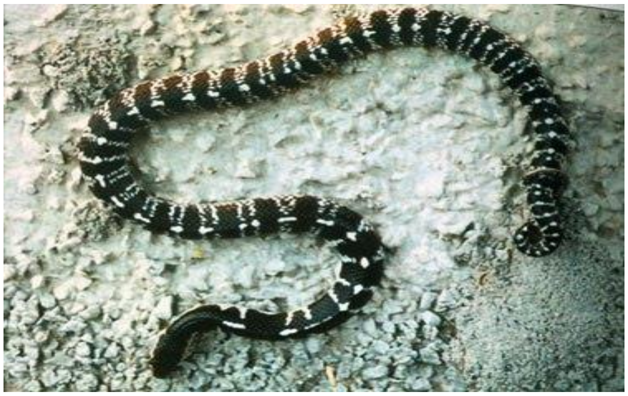


**Fig.11.2.** *Bungarus sindanus sindanus* Boulenger.

*Colour*:
Dorsum with similar color and pattern as in preceding species, except that first light stripe appears at the level of eleventh to fifteenth ventral.

*Habitat*:
Deserticolous situations. In the Thar, Cholistan, and Thal Deserts fine sandy alluvium with sparse vegetation.

*Range:*
Reported from Umar Kot and Khanpur in Sindh, Bahawalpur, Bahawalnagar, Rhimyar Khan in Punjab, Pakistan.

### *3. Bungarus sindanus razai* **M**. S. Khan

(**Fig.11.3 & 11.1B**)

1. Midbody scales 17.
2. Ventrals 214-221.
3. Subcaudals 44-47.

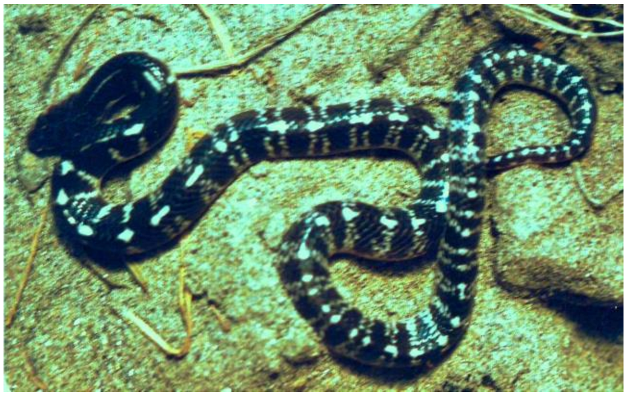


**Fig.11.3.** *Bungarus sindanus razai* M.S. Khan.

*Range***.**
Northwestern highland, reported from Azad Kashmir.

### *4. Naja n. naja* (Linnaeus)

(**Fig.11.4**)

1. Medium sized, heavy snake.
2. Head not distinct from body, neck dilatable into an expanded hood.
3. Loreal absent.
4. No maxillary teeth (very rarely 1).
5. Body scales smooth, in 21-23 at midbody.
6. Ventrals 182-196, subcaudals 53-67. Snout-vent length 1658-1670 mm; tail 269-272 mm.

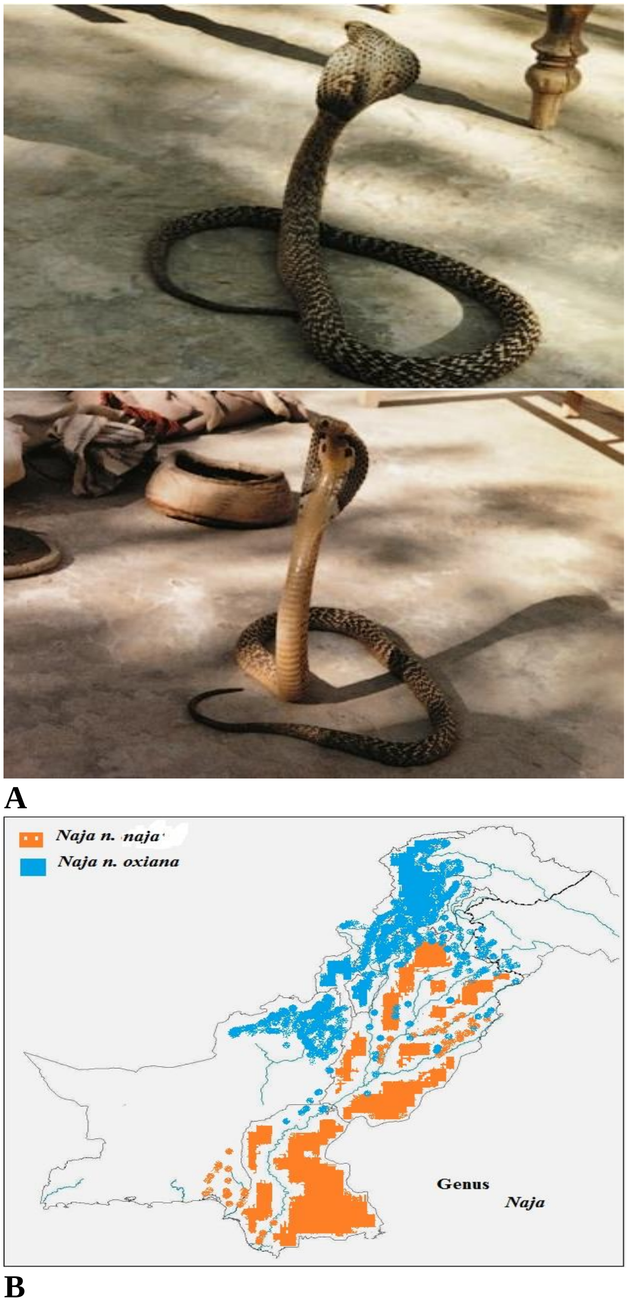


**Fig.11.4.** *Naja n. naja* (Linnaeus). B shows distribution of *Naja n. naja* in different parts of Pakistan.

*Colour*:
Adult jet black, dark olive or dark brown, or, variegated. Ventrum pale gray to yellowish with heavy slate gray or dark brown clouding. A spectacle mark on hood dorsum and a large round dark ocellus ringed with yellow on hood

ventrum, medially interrupted by dark sub-hood ventrals. Usually, variegated specimens with light-edged brown scales are met with in Punjab, while jet black snakes are rare. Juveniles with dark cross bands.

*Habitat*:
Frequents grassland, vegetation along tilled fields, water courses, semidesert forests, barns, ruins with grassy growths, and growths around villages. Plentiful in paddy growing area, where it is attracted by mice and poultry into inhabited houses.

*Range*:
Reported from Bangladesh, throughout India and Sri Lanka. In Pakistan it extends along the eastern border of the Indus from Khyber Pakhtunkhwa, Punjab, and Sindh.

### ***5. Naja n. oxiana*** (Eichwald)

**(Fig.11.5 & 11.4B)**

Both species of genus *Naja* are morphologically very close to each other. Resting on a careful study of the variables, *N. oxiana* is diagnosed as follows:

1. Ventrals 191-210, subcaudals 62-71.
2. One enlarged maxillary tooth.
3. Juvenile pattern conspicuously banded, bands extend on ventrum of body.
   Snout-vent length 1512-1520 mm, tail 236-240 mm.

*Colour*:
Light yellowish to light brown, with or without a hood mark. Two or three dark ventrals under hood. Ventrum clouded with dark.

*Habitat*:
Inhabits dry wasteland, lives in holes and crevices in uneven ground. In mountainous areas it lives in caverns, crevices, and holes in rocks

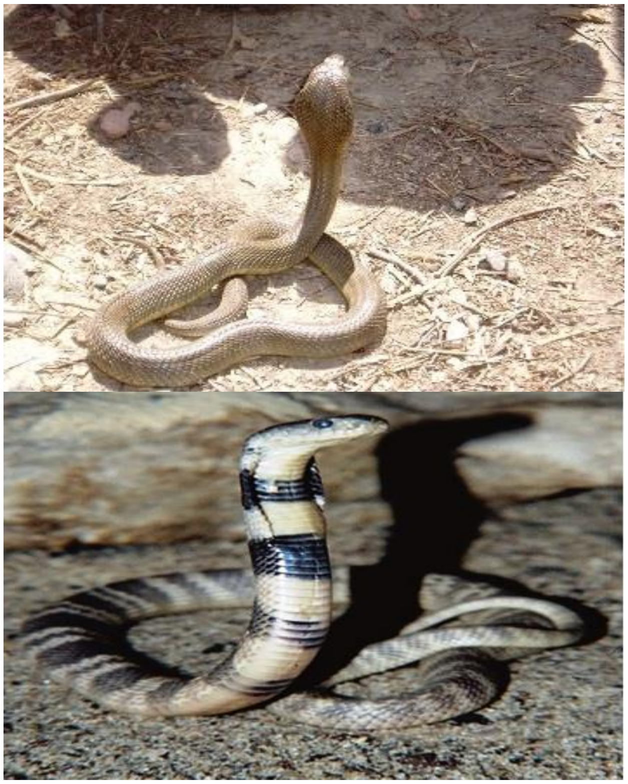


**Fig.11.5.** *Naja n. oxiana* (Eichwald).

*Range*:
From Trans caspia and southern Turkmenistan, eastern Iran, and Afghanistan. In Pakistan it is reported from throughout Khyber Pakhtunkhwa, northeastern Balochistan to northwestern Punjab and Kashmir.

### Family Viperidae

**Key:**

1. Snout flanked with enlarged butterfly-like scales jutting laterally............................. out
   .......................*Eristicophis macmahonii*
   Snout flanked with small ...................scales
2. Laterals small, strongly oblique, with serrated keels ......................*Echis carinatus*
   Laterals with entire keels ...........................3
3. A group of elevated supraoculars forming "horn"; keels ending in knobs ......................
   ....................... *Pseudocerastes persicus*

No supraorbital horn; keels normal .......... 4

4. Pattern of indistinct blotches on body; midbody scale rows 23-27 ........................... ........................... *Macrovipera lebetina*

Pattern of 3 rows of vivid dark brown ocelli; ocelli of middorsum, often fused to form a chain; 27-33 scale rows at midbody ..................................... *Daboia russelii*

### 1. *Daboia russelii* (Shaw and Nodder)
(**Fig.11.6**)

1. Head longer than broad, distinct from neck, body stout, dorsoventrally flattened.
2. Nostril large, crescentic in shape, in a large nasal scale.
3. Supraocular scale undivided.
4. Supralabials 11 to 12, separated from eye by 3-4 rows of small scales; 13-15 infralabials.
5. Anterior genial short and wide, posterior not differentiated.
6. Dorsals strongly keeled in 27-33 rows at midbody.
7. Ventrals 164-178, subcaudals 46-58, anal not divided.

Snout-vent length 1080-1090 mm, tail 220-225 mm.

*Colour*:
Dorsum light yellowish brown to sandy, with a median series of 22-32, large oblong chestnut blotches, bordered with black or dark brown, narrowly edged with cream, arranged lengthwise, mostly confluent with each other to form a middorsal chain. A lateral series of similar but smaller spots which on lower side are with scattered dark flecks with lighter edges. A pair of dark spots at base of head.

*Habitat*:
Inhabits mesic habitat of grass fields with marginal trees, salty scrubby areas, along marginal growths of water bodies, hedges and fences along gardens and gallery forests.

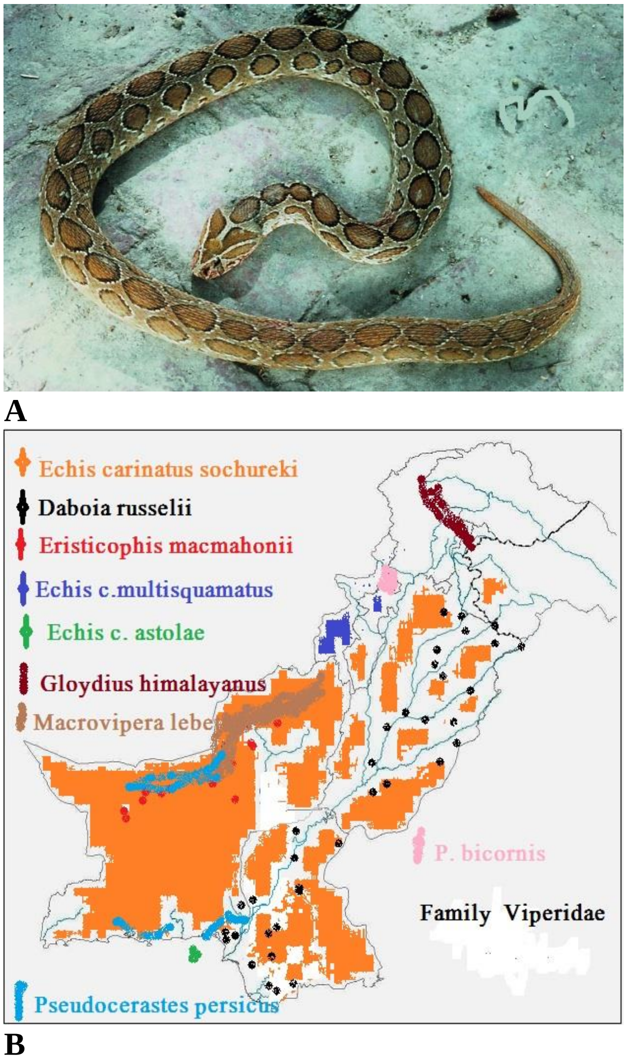


**Fig.11.6.** *Daboia russelii* (Shaw and Nodder). B shows distribution of various species of family *Viperidae* in different parts of Pakistan.

*Range*:
Recorded from throughout the Indus Valley, from Karachi to Rawalpindi, at low altitudes. It is reported from throughout India to Bangladesh, extends into peninsular India and Sri Lanka. Distinguished in several races throughout Southeast Asia to Taiwan.

### 2. *Echis carinatus* (Schneider)
(**Fig.11.7 & 11.6B**)

1. Head short, distinctly wider than neck,

covered with small strongly keeled imbricate scales, 8-12 between supraoculars.

2. Nostrils small, dorsolateral.
3. Supralabials 8-12, separated from ocular by 1 or 2 rows of small scales; 10-13 infralabials.
4. Anterior genial broad, followed by 3 pairs of slightly enlarged scales.
5. Dorsals at midbody in 24-37 rows, strongly keeled, median dorsals large, arranged in straight lines, while 3-7 rows of laterals smaller, oblique, pointing downward, with serrated keels.
6. Ventrals 132-188, subcaudals 23-39, entire; anal single.
7. Body stocky, tail very short and abruptly tapering from vent.

   Snout-vent length 600-625 mm, tail length 51-56 mm.

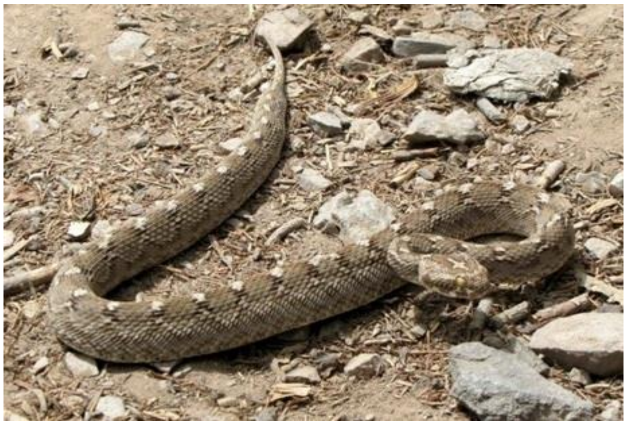


**Fig.11.7.** *Echis carinatus* (Schneider).

*Colour*:
Dorsum light brown to yellowish brown, sometimes olive brown. A median row of 28-37 dark-edged, whitish blotches. Flank with undulating white line, dorsal loops of which are more prominent, but are diluted ventrally. Head with light arrowhead mark, posterior three prongs of which extend to considerable distance. A pale stripe from eye to angle of mouth. Labials light, dotted. Ventrum white to light pinkish, with fine dark gray spots.

*Habitat*:
Recorded from sandy and rocky alluvial habitat, with sparse xerophytic to moderately dense grass and scrub vegetation. In mountainous habitat it lives under rock blocks, while in submountainous regions it inhabits hedges and other scrubby vegetation, noticeably avoiding marshy areas and very dense vegetation.

*Range*:
Widely distributed from northern Africa, through the Middle East, southern former Russia, descending to Iran, Afghanistan, most of Pakistan excluding the high northern mountains, India, and Sri Lanka.

### ***Echis carinatus astolae*** Mertens
(**Fig.11.6B**)

Dark blotched saw-scale viper: *Astola khappra saamp*

1. Dorsum whitish.
2. Dorsal pattern of dark brown blotches, with 1-3 lateral longitudinal rows of dark brown spots.
3. No lateral light arcs.
4. Head with 3 pronged light mark directed towards snout.
5. A light stripe from temporals, on each side, meeting each other at frontal region giving a branch to snout.

*Range*:
This race has been described from Astola Island, 25 km southeast off the Pasni coast, Balochistan, Pakistan.

### ***Echis carinatus multisquamatus***
Cherlin (Plate 164)
(**Fig.11.8 & 11.6B**)

Waziristan saw-scale viper: *Waziristan khappra*

*saamp* 1981 *Echis carinatus multisquamatus* Cherlin, Proc. Zool. Inst. Acad. Sci. 101:92-95.
Type locality: Bayram-Ali, Marysk area, Turkmenia.

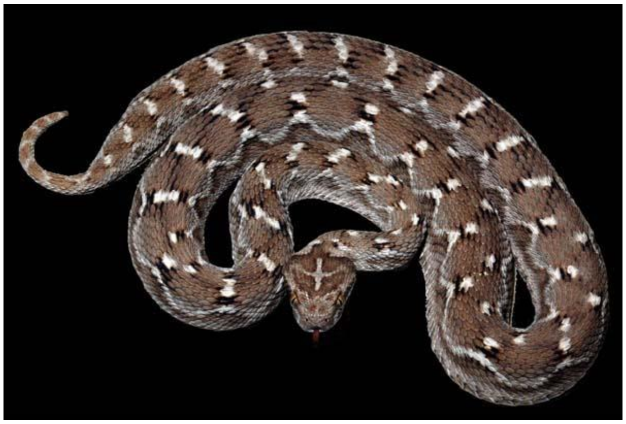


**Fig.11.8.** *Echis carinatus multisquamatus* Cherlin (Plate 164).

*Diagnosis:*
1. Head mark is always cross-shaped.
2. Lateral continuous undulating white line present.
3. Narrow transverse white bands on middorsum.
4. Midbody scale counts 34-40 (highest of all subspecies).
5. Number of ventrals 169-199 (highest of all subspecies).

*Range*:
From the Caspian Sea, through Turkmenistan, into Bukhara, Samarkand and Tashkent to Tajikistan along the Afghan border, up to Hindu Kush, northeastern Balochistan and eastern Iran.

### 3. *Echis carinatus sochureki* Stemmler
(**Fig.11.9 & 11.6B**)

Sindh Valley saw-scale viper: *Sindhi khappra saamp*

It is the widely distributed race of saw-scale viper in Pakistan, distinguished from the rest of the races by the following characteristics:

1. Head scales small, except 3-4 larger supraoculars.
2. Midbody scale rows 29-33.
3. Middorsals flat.
4. Oviparous.

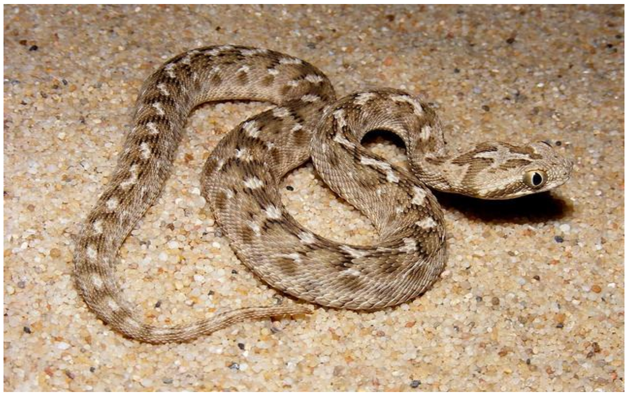


**Fig.11.9.** *Echis carinatus sochureki* Stemmler.

*Colour*:

Dorsum tan, grayish, or brown, with a median row of 30 whitish (never yellowish) blotches with dark brown edges. Body sides with wide V-shaped ventrally open marks and with distinct dark spots. Ventrum whitish with dark gray spots. Head with light arrowhead, directed toward snout. A light loreal stripe extending to angle of mouth.

*Range*:
It ranges to northern India, the whole of Pakistan except high mountains in north, southern Afghanistan, central Iran to the Iranian Gulf coast and Khuzestan.

### 4. *Eristicophis macmahonii* Alcock & Finn
(Leaf-nose viper: *Titli afi)*
(**Fig.11.10 & 11.6B**)

1. Rostral much broader than high, crescentic and deeply concave, surmounted on each

side by a wing-like, free edged, broad "butterfly" scale.

2. Small circumocular scales 16-25.
3. Supralabials 15-16, forming serrated dorsal lip, separated from eye by 3 rows of scales, about twice as large as those of the ocular ring.
4. Scales at midbody 23-29, arranged in straight regular rings.

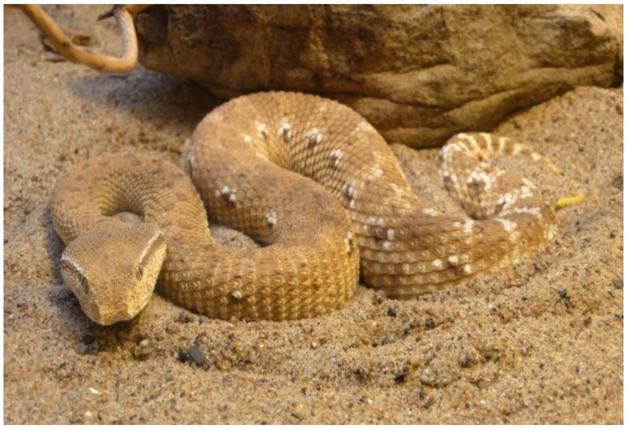


**Fig.11.10.** *Eristicophis macmahonii* Alcock & Finn (Leaf-nose viper: *Titli afi).*

6. Ventrals 140-145, ventrals with a keel on each side; anal undivided.
   Snout-vent length 655-660 mm, tail length 72-78 mm.

*Colour*:
Dorsum light reddish brown to khaki, with a series of small dark brown lateral spots, each surrounded in its upper half by light dots. A thin light stripe from eye to angle of mouth. Base of tail with brown crossbars. Ventrum white.

*Habitat*:
This snake is morphologically adapted to live in the fine loose sand of shifting dunes. Its habitat is without any mentionable vegetation, except for very sparse growth of stunted bushes and grasses.

*Range***:**
Recorded from Seistan in the extreme east of Iran into Afghanistan south of the Helmand River and southwestern Balochistan, between the Chagai Hills and the Siahn Range, east to Nushki.

### 5. *Pseudocerastes bicornis* Wall

*General characters*:
All what we have now as type specimen of this viper preserved in British Museum of Natural History London, under registry number 1946.1.20.82, a viperid head with 2-3 head lengths of anterior part of body, up to 31 ventral, rest of the body apparently is lost. The two elongated free supraocular scales of P. bicornis, were erected in life as a pair of supraocular horns on each side.

*Range***.**
Reported from Khajuri Kach, above Gwaleri kolal, Gomal Pass, Waziristan, Pakistan.

### 6. *Pseudocerastes persicus*
(Duméril, Bibron & Duméril)
(**Fig.11.11 & 11.6B**)

1. A supraorbital horn on each side formed by several scales.
2. Body moderately stout, dorsoventrally flattened.
3. Circumocular scales 16 to 18.
3. Supralabials 12 to 14, separated from eye by 3 rows of small scales; 14-17 infralabials.
3. Anterior genial large, posterior not differentiated from surrounding scales.
4. Dorsals thin, weakly keeled, 23-25 rows at midbody, laterals with a nodular prominence at posterior end.
5. Ventrals without lateral keels, 146-151, subcaudals 42-46.
   Snout-vent length 688-690 mm, tail 80-85 mm.

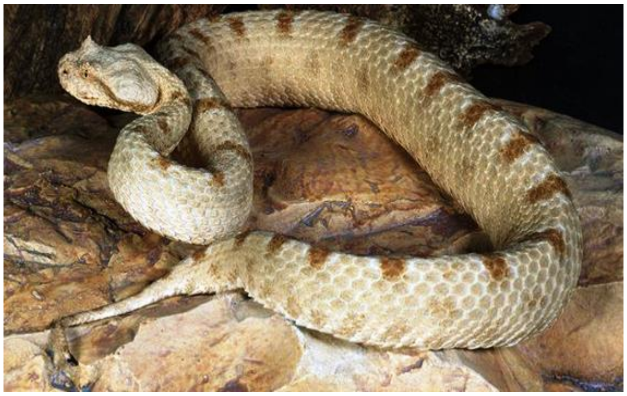


**Fig.11.11.** *Pseudocerastes persicus* (Duméril, Bibron & Duméril).

*Colour*:
Dorsum pale gray or bluish gray to khaki. A median series of 28-33 rectangular gray or brownish blotches or cross bands, much narrower than interspaces. An alternating series of faint spots on sides. A dark band from nostril to the angle of jaw, lower edges of labials white. Belly white; in larger snakes the tip of tail dark, medially pinkish.

*Habitat*:
Inhabits sandy and rocky terrain with moderate vegetation of bushes and grasses. It is nocturnal in habits, retreats during the day into crevices among rocks or burrows in comparatively hard soil near roots of bushes. Its dietary consists of deserticolous lizards, mice, and arthropods. It breeds from March to July.

*Range*:
Collected up to 2200 m of elevation. It has been recorded from Azerbaijan and northern Iraq through Iran south to Persian Gulf, eastward to central Afghanistan and western Las Bela.

### *7. Macrovipera lebetina* (Dwigubsky)
**(Fig.11.12 & 11.6B)**

1. Head short and wide.
2. Supraoculars usually divided.
3. Supralabials 10 to 11, separated from eye by 2 to 3 rows of small scales, 12-14 infralabials.
4. Dorsals keeled, in 23-25 rows at midbody.
5. Ventrals 168-176, subcaudals 42-49.
   Snout-vent length 1040-1045 mm, tail length 143-148 mm.

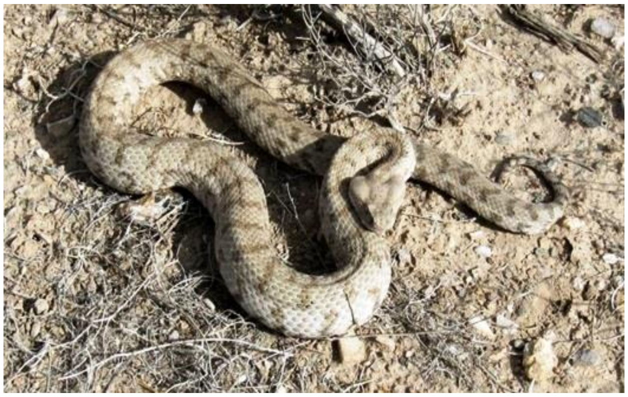


**Fig.11.12.** *Macrovipera lebetina* (Dwigubsky).

*Colour*:
Dorsum khaki to yellow brown, with minute spots. A median row of 39-42 indistinct dark gray crossbars. Ventrum buff, anteriorly whiter, clouded with gray. Tail pinkish brown.

*Habitat*:
This snake inhabits stony semiarid country with sparse scrubby vegetation, between 1000 and 2500 m of elevation.

*Range***:**
Its Range extends from Caucasus to Lebanon, through southern Turkmenistan and Uzbekistan. In Pakistan its records are from the Waziristan Hills, Quetta highlands, and Chitral.

## Family Crotalidae

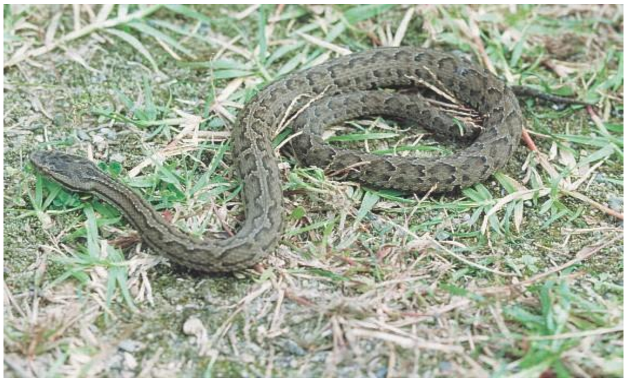
Head long, depressed, with large symmetrically arranged scales, sometimes snout scale broken in small scales; naris lateral; eye with vertically

elliptical pupil; a loreal pit between eye and nostril; subcaudals divided, anal scale entire.
A single genus represented in alpine Pakistan.

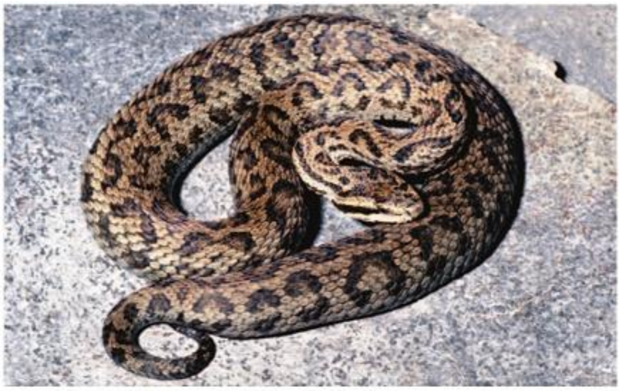
### **Genus *Gloydius*** Hoge and Romano-Hoge, 1981

Head with large symmetrically arranged shields; a "pit" between eye and nostril; eye separated from supralabials; body scales strongly keeled.
**A s**ingle species known from alpine Pakistan.

### ***Gloydius himalayanus*** (Günther)
(Himalayan pit-viper: *Hamaliai hafra afi)*
(**Fig.11.13**)

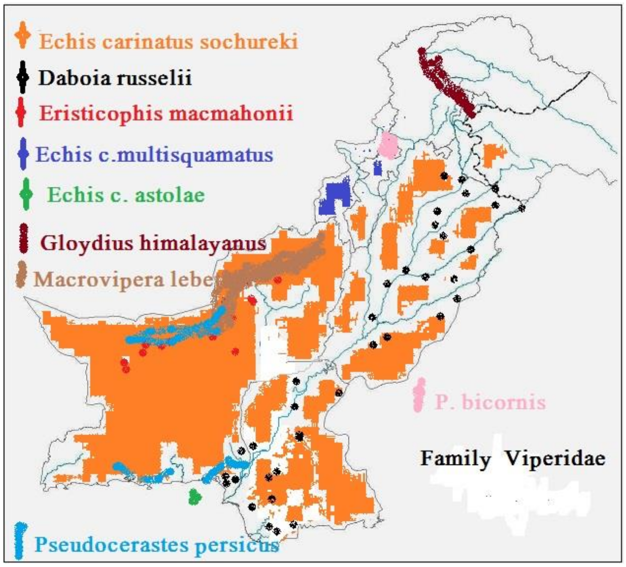


**A**

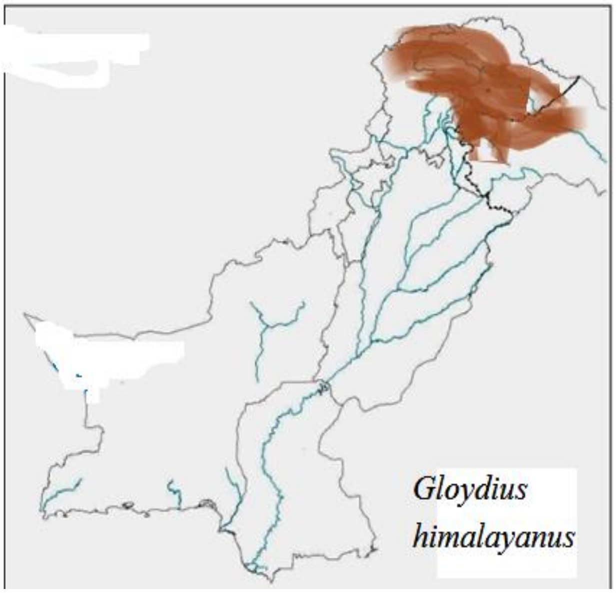


**B**

1864 *Halys himalayanus* Günther, Rept. Brit. Ind.: 393.



**C**



**D**

*Type locality*:
Garhval, western Himalayas, India.

*Diagnosis:*
1. Distinct head with large symmetrical scales.
2. A distinct pit between eye and nostril.

3. A pair of pre- and postoculars, lower postocular long, separating supralabials from eye.
4. Supralabials 7, posterior 2 united with temporals to form large post-temporal scales; 9-10 infralabials.
5. Only a single short broad genial.
6. Body scales strongly keeled, 21 rows at midbody.
7. Ventrals 147-175, subcaudals 32-52 divided.
   Snout-vent length 565-570 mm, tail 98 mm.

*Natural history notes*:

This mountain snake is restricted to an elevation of 1500 m; however, it has been reported from Dharmsala Glacier at 5000 m of elevation, the highest altitude for a snake (Wall 1910; for discussion see Gloyd and Conant 1990). It frequents rocky wooded hillsides where it lives in caverns and crevices in rocks. It takes refuge under leaf litter and fallen timber. It may be found in open fields, orchards, and hiding under marginal grass. It hibernates from October to April. Though nocturnal, it is known to bask on bright sunny days on hilly slopes. It usually selects a spot within easy reach of cover, to which it withdraws in a leisurely manner when disturbed since it is a sluggish slow-moving snake. When provoked the snake flattens its body; sometimes it coils up and vibrate its tail tip (Khan and Tasnim 1986).

**Fig.11.13.** A,B *Gloydius himalayanus* (Günther) (Himalayan pit-viper: *Hamaliai hafra afi).* C,D shows distribution of *Gloydius himalayanus* (Günther) in different parts of Pakistan.

It feeds mainly on skinks, other lizards, mice, millipedes, and centipedes. Adults often accumulate much fat, during summer body organs are packed with fat. Viviparous, it gives birth to 5-7 young from August to September (Khan and Tasnim 1986b).

Bite by *Gloydius himalayanus* results in local intense pain and swelling subsiding within 2-3 days, having no dangerous effect, and needing no real treatment (Acton 1921). In Kashmir local people do not fear this snake; rather they revere it (Dattatri 1985).

*Distribution*:

The Himalayan pit-viper is recorded from Nathia Gali in the western Himalayas and eastern Khyber Pakhtunkhwa, Pakistan (Khan and Tasnim 1986). The author has seen a specimen in the Government College Natural History Museum, Lahore, Pakistan, from the Dosai Plains, Baltistan, northeastern Pakistan. The viper is known to be very common in the western Himalayas, less so beyond Nepal (Wall 1910). However, its range extends from Sikkim to Chitral in the north, extending into eastern Khyber Pakhtunkhwa, Pakistan.

Snout-vent length 565-570 mm, tail 98 mm.

*Colour*:

Dorsum light brown-gray to dark brown. A median series of dark brown blotches, alternating with lateral row of spots. A broad dark band from eye to angle of mouth. Supralabials light with dark mottling. Ventrum light gray with dark clouding and fine spotting.

*Habitat*:

Mountain snake, is restricted to an elevation of 1500 m; however, it has been reported from Dharmsala Glacier at 5000 m of elevation, the highest altitude for a snake.

## Venomous Sea Snakes Hydrophiidae
## Sea snakes

All marine snakes are venomous

In sea the snakes are curious and are attracted to any moving object. They may approach a diver or swimmer; however, are shy usually keep their distance. If you encounter one, keep calm and move away slowly.

Don't touch! Mostly bites happen when fishermen touch the snakes in their catch in nets, be careful when handling nets, especially at night.

If you get hurt. Treatment is the same as for ordinary snake bites:

1. Call for immediate medical help. Antivenin is the only cure.
2. Apply a mild pressure at site, immobilize by loosely wrapping bandage.
3. Reassure the victim and help keep him/her still and calm.

Sea snakes do not leave water, and rarely extend in inland waters (rivers, lakes), so are of least concern in Pakistan, except along costal sea waters.

## Family Hydrophiidae

**Key:**

1. Ventrals distinct throughout, normally undivided ........................................ 2
   Ventrals, except anterior, either divided by a median longitudinal fissure or indistinct ....... 3
2. Mental scale elongate, partially hidden in a groove between first infralabial; ventrals uniform in size ............ *Enhydrina schistosa*
   Mental scale normal.................................. 5
3. Head very small; neck long, slender; body thick; ventrals divided by a longitudinal fissure........................................................ 4
   Head and body not as above .................... 12
4. Prefrontal touches third supralabial; ventrals 404-468 .........................................
   ..................*Microcephalophis cantoris*
   Prefrontal not touching third supralabial; ventrals 320-350 ...*Microcephalophis gracilis*
5. Ventrals broad anteriorly, narrower posteriorly...................*Praescutata viperine*
   Ventrals uniform in size............................ 6
6. Adult with very small head and long, slender neck ............................................... 7
   Adult with large head; neck not distinct from body .................................................8
7. Ventrals 390 or more.................... *fasciatus*
   Ventrals less than 390 .................................
   ........................... *Hydrophis mamillaris*
8. Scales on thickest part of body with round or blunt tips; imbricate; adult length more than one meter ...........................................9
   Scales on thickest part of body hexagonal or quadrangular; imbricate or juxtaposed; length rarely exceeds 1 meter..................10
9. Anterior temporal normally one..................
   ................................*Hydrophis spiralis*
   Anterior temporals normally two
   ........................*Hydrophis cyanocinctus*
10. Adult with bluish gray bands on body; maxillary teeth more than 13.......................
    ........................*Hydrophis caerulescens*
    Adult with dark gray or greenish bands on body; maxillary teeth less than 13............11
11. Head top with curved yellow mark; ventrals 314-322.......*Hydrophis lapemoides*
    Head top mark absent; ventrals 209-312......
    ................................*Hydrophis ornatus*
12. Dorsals juxtaposed ..................................13
    Dorsals pointed, strongly imbricate; ventrals indistinct ...............*Astrotia stokesii*
13. Ventrals distinct anteriorly, indistinct posteriorly ...........................*Lapemis curtus*
    Ventrals with a longitudinal fissure; dorsals subquadrangular ............... *Pelamis platurus*

### ***1. Astrotia stokesii*** (Gray)

(**Fig.11.14**)

1. Head large, body short, stout with entire and regular sales.
2. Single preocular, 2 post oculars.
3. Nostril dorsal, nasal scales in contact with each other.
4. Supralabials 8-10, second sometimes third, in contact with prefrontal, fourth to sixth touching eye; 10-12 infralabials,

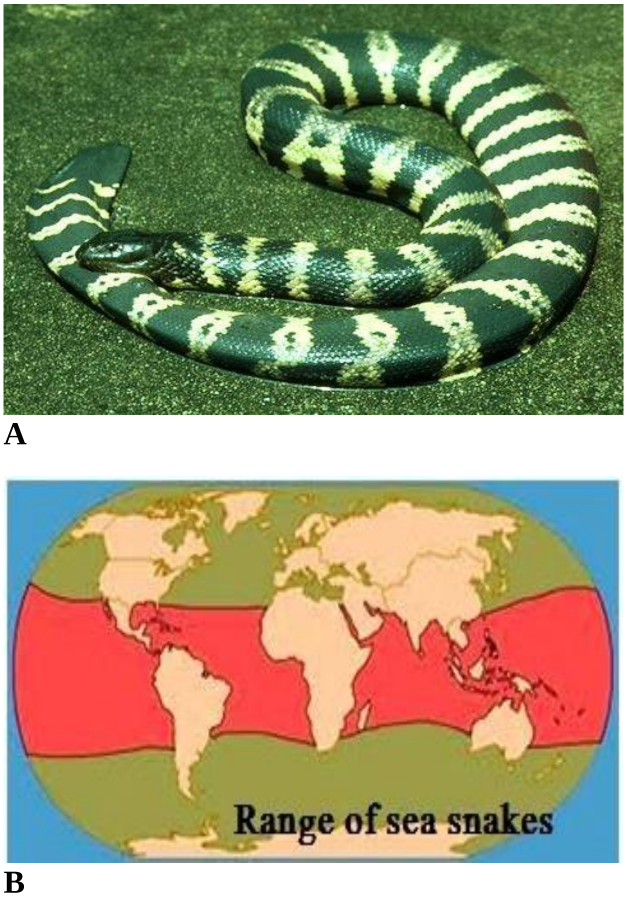


**Fig.11.14.** *Astrotia stokesii* (Gray). B shows range of sea snakes.

5. No distinct genials; body scales strongly imbricate, pointed, keeled, keels often broken in tubercles, 37-47 scale rows on neck, 47-59 on body.
6. Ventrals completely divided, except anterior-most, differentiated from rest of body scales with serrated margins; preanal strongly enlarged.
   Snout-vent length 1028-1050 mm, tail 159-180 mm.

*Colour*:
Dorsum yellowish or pale brown, with 32-37 more or less complete broad dark brown rings, or the dorsal pattern may be of bars and ventrum with spots. Head dark olive or yellowish.

*Habitat*:
Recorded from depth of 25-45m. It is very aggressive in water attacks repeatedly when captured.

*Range*: From the Far East, Australia, Malay Peninsula, Bay of Patani, Singapore, Sri Lanka, along peninsular India, and extending along the Makran Coast in Pakistan.

### ***2. Enhydrina schistosa*** (Daudin)
(**Fig.11.15**)

1. Head of moderate size, slightly distinct from slender and much elongated neck, skin of which is loose, body moderately stout and laterally compressed.
2. Head scales densely tuberculated, rostral produced downward in a beak.
3. One anterior temporal and one postocular; 7-8 supralabials, third or fourth, fourth or fifth touching eye, 9 or 10 infralabials.
4. Genials not well differentiated.
5. Scales at midbody 51-65, subimbricate, with short central keel.
6. Ventrals small, 300-365; 2-6 preanals.
   Snout-vent length 1020-1045 mm, tail 130-135 mm.

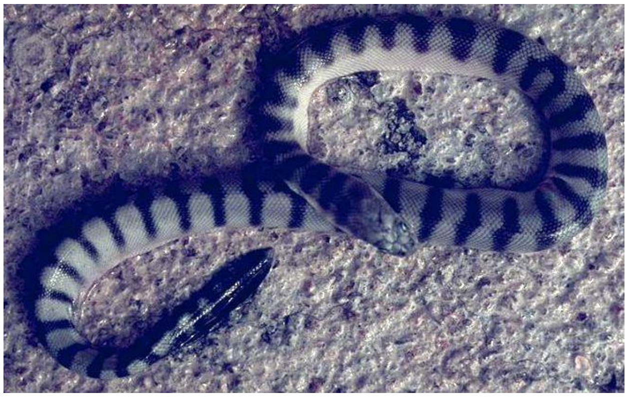


**Fig.11.15.** *Enhydrina schistosa* (Daudin).

*Colour*:
Dirty white to pale greenish gray, with olive to

black crossbars, distinct on posterior half of body. Ventrum white to light yellow, throat white. Sides of tail with few dark scales. Large adults often uniformly olive above. Newborn white with vivid black bands.

*Habitat*:
Causing most of the fatalities among fishermen. It frequents estuarine waters with muddy bottoms and does not go into deeper waters, frequents deep into creeks well away from the open sea.

*Range*:
From Gulf of Oman eastward to the coast of southern Viet Nam, along Australia to Rockhampton. It is a most common sea snake along the coastal waters of Pakistan.

### 3. ***Hydrophis caerulescens*** (Shaw)
(**Fig.11.16**)

1. Head small, not distinct from neck which is not markedly elongated.
2. Body strongly compressed laterally, about 2-3 times the diameter of neck.
3. Scales feebly imbricate or juxtaposed, distinctly keeled, 38-54 rows at midbody.
4. Supralabials 7, second in contact with the prefrontal, third and fourth are in eye, 9 infralabials.

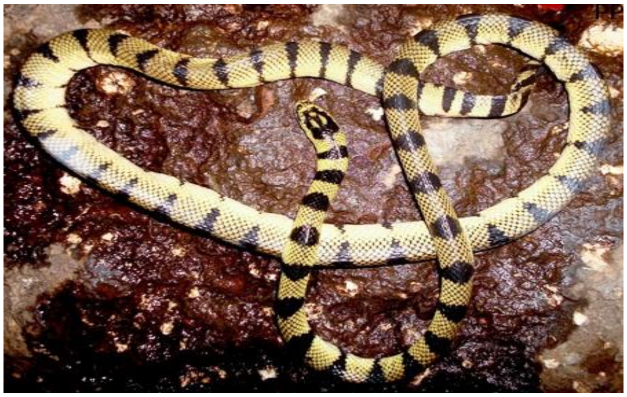


**Fig.11.16.** *Hydrophis caerulescens* (Shaw).

5. Ventrals 301-310.
   Snout-vent length 770-785 mm, tail 97-104 mm.

*Colour*:
Dorsum bluish gray, ventrum yellowish, with 39-62 broad dark bands, about twice as broad as interspaces, becoming indistinct with age. Head dark in young, becoming dark gray in adult, usually with a light streak through eye.

*Habitat*:
The blue-green sea snake has been recorded from mangrove swamps near Karachi, Sindh, Pakistan.

*Range*:
Wide ranging in Southeast Asia, from the northern coast of Australia, to Queensland, Borneo, Java, Malaya, Myanmar, and along the coasts of China, Siam, India. In Pakistan it has been reported from the Karachi coast.

### 4. ***Hydrophis cyanocinctus*** Daudin
(**Fig.11.17**)

1. Head moderately small, slightly distinct from neck, rostral prolonged ventrally.
2. Body cylindrical anteriorly, laterally compressed posteriorly.

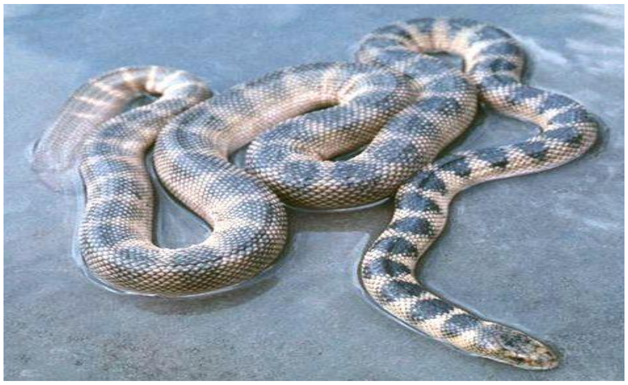


**Fig.11.17.** *Hydrophis cyanocinctus* Daudin.

3. Scales imbricate with 2-3 keels, or row of tubercles, 38-48 at midbody.

4. Supralabials 7-8, second in contact with prefrontal, 2-3 touching eye, 9-10 infralabials.
5. Ventrals distinct 314-384, anteriorly about twice the size of adjacent scales, a little smaller posteriorly.
   Snout-vent length 1500-1650 mm, tail 130-140 mm.

*Colour*:
Dorsum dirty white, pale green or yellow, with 47-70 black cross bands, those at midbody widest, central part of the bands often include light scales. Markings on body usually disappear with age.

*Habitat*:
It has been netted from shallow muddy mangrove swamps during monsoons, after which it migrates to the open sea.

*Range*:
Wide ranging species from the Persian Gulf along the coastal waters of Pakistan, the Indian coast, Sri Lanka, Bangladesh, Siam (Thailand), Islands of Indonesia to the Sea of Japan.

### 5. *Hydrophis fasciatus* (Schneider)
(**Fig.11.18**)

1. Head very small, body very slender anteriorly, deep, and greatly compressed posteriorly.
2. A series of 2-4 small scales behind parietals and between posterior temporals.
3. Supralabials 6-7 (rarely 5), third and fourth touching eye, last 1 or 2 very small.
4. A small "cuneate" scale between third and fourth infralabials.
5. Posterior body scales imbricate, slightly hexagonal, 49-53 at midbody, with a central tubercle or keel.
6. Ventrals with double keel, 323-514 at midbody.
   Snout-vent length 1080-1106 mm, tail 100-110 mm.

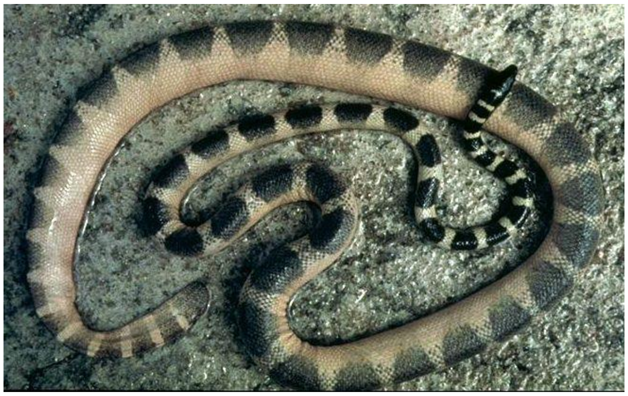


**Fig.11.18.** *Hydrophis fasciatus* (Schneider).

*Colour*:
Dorsum black to olive, with pale or yellowish oval spots on sides. Ventrum whitish. In young 50-70 black crossbars which may or may not form complete rings.

*Range*:
From coastal Pakistan it extends along the Indian coast, Sri Lanka, Myanmar to the Strait of Malacca.

### 6. *Hydrophis lapemoides* (Gray)
(**Fig.11.19**)

1. Temporals small, 2 + 3 or 3 + 3.
2. Supralabials 8, second in contact with prefrontal, third and fourth or third to fifth touching eye.
3. Scales at midbody 39-45, a feeble tubercle or keel on scales of posterior half of the body.
4. Ventrals 324-346, bicarinate.
   Snout-vent length 930-950 mm, tail 94-100 mm.

*Colour*:
Young snakes with yellowish or whitish dorsum, with 32-43 dark crossbars. Head dark with a yellow curved mark. In older specimens markings on body become less pronounced.

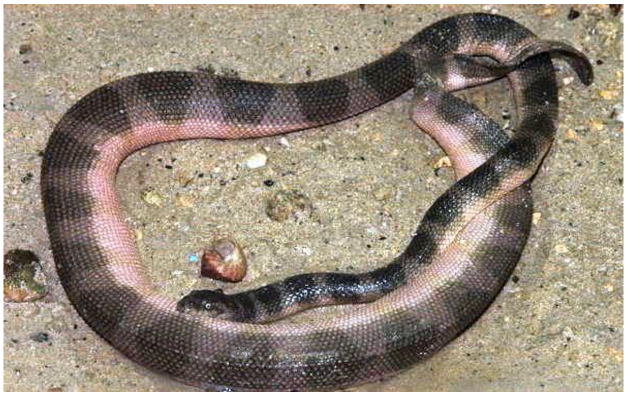


**Fig.11.19.** *Hydrophis lapemoides* (Gray).

*Habitat*:

Invades estuarine waters, and is often thrown on shore.

*Range*:
From the Persian Gulf, along coasts of Pakistan, India, and Sri Lanka.

### *7. Hydrophis mamillaris* (Daudin)
(**Fig.11.20**)

1. Temporals variable, usually 2-3 imbricate scales.
2. Supralabials 7, second in contact with prefrontal, third and fourth touching eye; usually a small "cuneate" scale between third and fourth infralabial.
3. Scales at midbody 39-43, those of posterior part of body, hexagonal, with a central tubercle or short keel, juxtaposed, or feebly imbricate.
4. Ventral 305-384, bicarinate.
   Snout-vent length 743-750 mm, tail 63-70 mm.

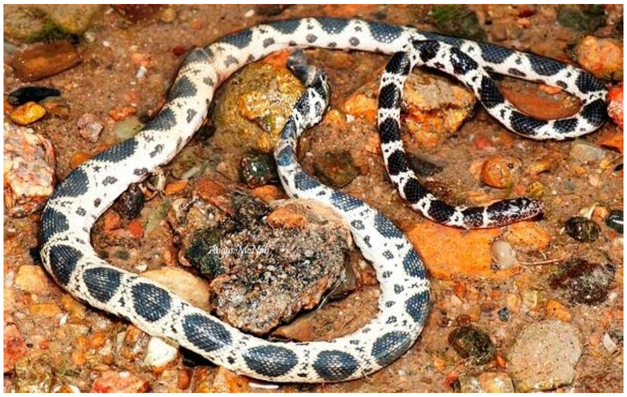


**Fig.11.20.** *Hydrophis mamillaris* (Daudin).

*Colour*:
Dorsum yellowish or grayish, with 43-57 broad crossbars, about twice as broad as their interspaces, usually connected along ventrals. Head entirely black with a yellow streak on temporal region.

*Range*:
From Karachi coast, along peninsular India.

### *8. Hydrophis ornatus* (Gray)
(**Fig.11.21**)

1. Head large, its breadth between eyes half or more than half its length; robust body, not markedly elongated, diameter of its posterior half about twice that of neck.
2. Supralabials 7-8, second in contact with prefrontal, third and fourth in eye.
3 A pair of overlapping anterior temporals.
4. Anterior genials well developed, in contact with each other, while posterior pair not well defined, separated from each other by small scales.

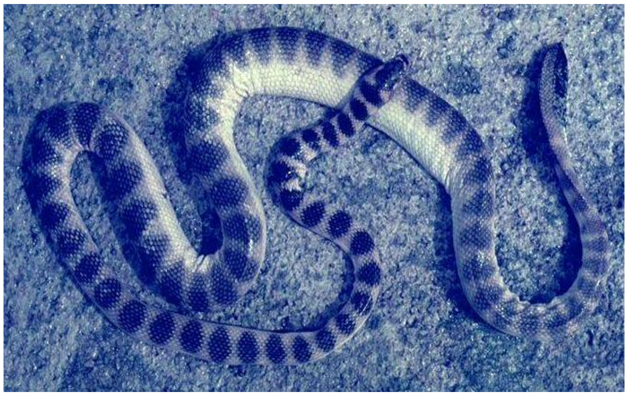


**Fig.11.21.** *Hydrophis ornatus* (Gray).

5. Body scales slightly imbricate or juxtaposed, with a central tubercle or short keel.
6. Rows at midbody 33-55.
7. Ventrals 209-312, distinct.
   Snout-vent length 850-855 mm, tail 107-115 mm.

*Colour*:
Dorsum grayish, olivaceus, or white, with dark bars or rhomboidal spots. Ventrum yellowish or whitish. Head olivaceus.

*Range***:**
From Persian Gulf, along coastal Karachi, peninsular India, Bangladesh, Sri Lanka, Siam, and New Guinea.

### ***9. Hydrophis spiralis*** (Shaw)
(**Fig.11.22**)

1. Head slightly distinct from neck, body slender and moderately compressed.
2. Supralabials 6-8, third and fourth or third to fifth in eye.

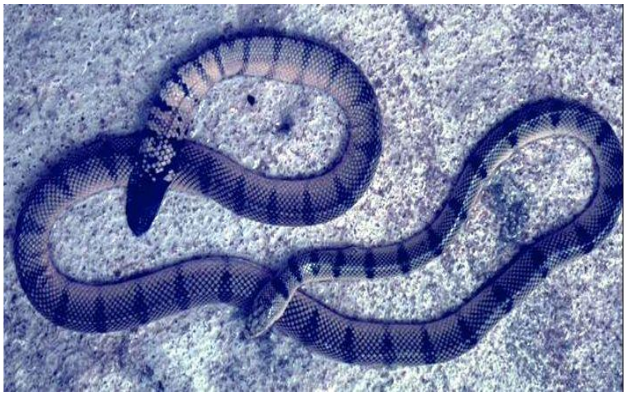


**Fig.11.22.** *Hydrophis spiralis* (Shaw).

3. Anterior and posterior genials well developed and in contact with each other.
4. Scales feebly imbricate, smooth or with a small tubercle or short keel.
5. Ventrals 340-350, distinct, twice as broad as adjacent scales.
6. Considerably enlarged preanals 2-5.
   Longest sea snake, snout-vent length 1896-1920 mm, tail 135-145 mm.

*Colour*:
Dorsum golden yellow to yellowish green, scales with dark borders, with 35-54 dark stripes which are narrower than interspaces, and are dark spotted. Flanks and ventrum of body pinkish white. Head in adult entirely yellow, in young blackish, with a yellow horseshoe-shaped mark.

*Habitat*:
It is a deep-sea snake, not venturing into estuarine waters. A gravid female contained 7 embryos in uteri.

*Range*:
From Persian Gulf along coastal Pakistan and India, Sri Lanka, Bangladesh, Myanmar to Celebes and the Philippines.

### ***10. Lapemis curtus*** (Shaw)
(**Fig.11.23**)

1. Body short, laterally strongly compressed, head short, slightly distinct from neck.
2. Rostral wider than high, trifid.
3. Single pre- and postocular, parietals broken into 5-6 small scales.
4. Nasal suture touching second supralabial. 6-7 supralabials, fourth touching eye; 9 infralabials.
5. Anterior genials small, not in contact with each other, posterior not differentiated.
6. Body scales smooth or with a central tubercle, male with short spine on lowest row, 35-39 at midbody.
7. Ventrals 165-180, anterior distinct, wider, posterior narrower, a pair of enlarged preanals.
   Snout-vent length 625-630 mm, tail 50-55 mm.

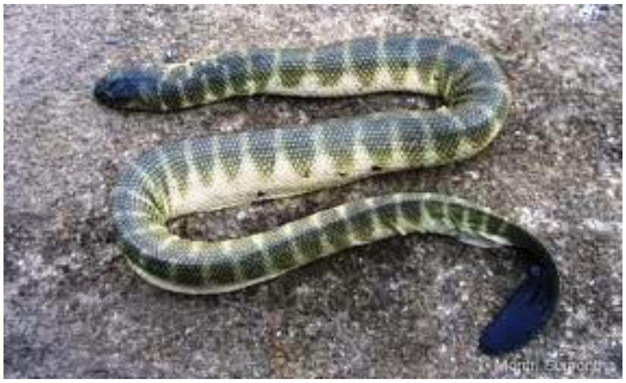


**Fig.11.23.** *Lapemis curtus* (Shaw).

*Colour*:
Dorsum pale olive, becoming white or pale yellow on sides. Black or dark olive crossbars 44-55 forming a median zigzag pattern, fading on sides. Head dark gray or olive; distal half of the ail black.

*Range*:
From Persian Gulf, along Makran and Karachi coasts, peninsular India, Sri Lanka to Madras.

### *11. Microcephalophis cantoris* (Günther)
(**Fig.11**)

1. Head very small, narrow, not distinct from long cylindrical neck.
2. Body stout, laterally compressed.
3. Single preocular, postocular, and temporals.
4. Supralabials 5-6, second and third or only the third in contact with the prefrontal, 7-8 infralabials.
5. Genials distinct, subequal
6. Ventrals 404-468.
   Total length 1450-1800 mm, tail 83-90 mm.

*Colour*:
Anterior half of the body light olive to yellow above, pale below, with gray to dark dorsal bars, and a black midventral stripe. While posterior half dark olive above, laterally yellowish, with faint lateral bars.

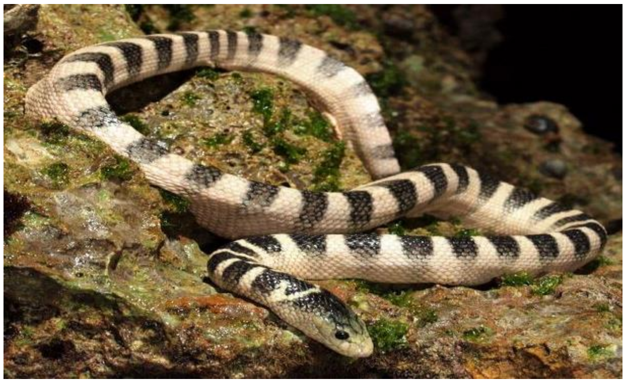


**Fig.11.24.** *Microcephalophis cantoris* (Günther).

*Range*:
From Karachi to Cannore, and on the east from Orissa to Chittagong.

### *12. Microcephalophis gracilis* (Shaw)
(**Fig.11.25**)

1. Second supralabial in contact with prefrontal.
2. Third supralabial not in contact with the prefrontal.

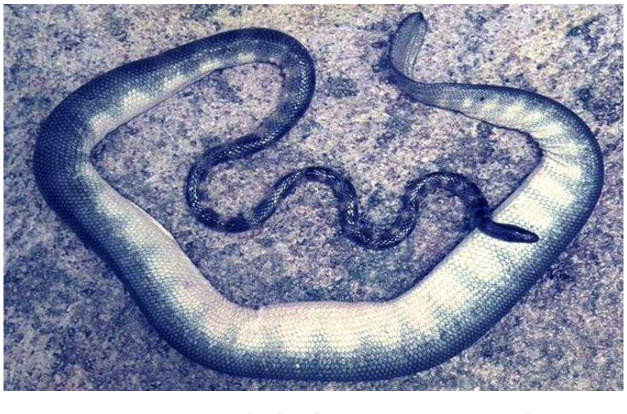


**Fig.11.25.** *Microcephalophis cantoris* (Günther).

3. Ventrals 220-350.
   Total length 950-1020 mm, tail 80-96 mm.

*Colour*:
Head, chin, and throat region black to dark olive, with white to pale yellow spots or crossbars. Posteriorly pale yellow to greenish white with gray crossbars, or more or less

uniformly gray above and light laterally and ventrally. Ventrum pale. Juveniles dark, with 40-60 light bars or paired spots.

*Range*:
From Persian Gulf, around the coast of Pakistan, India to China, Hong Kong, Borneo, and northern Australia.

### *13. Pelamis platurus* (Linnaeus)
(**Fig.11.26**)

1. Head long, narrow, distinct from neck which is not slender, body markedly compressed laterally.
2. One pre and 2-3 postoculars; anterior temporals 2-4.
3. Supralabials 6-8, with 1-3 small intercalated scales, fourth in contact with eye or separated from it by a subocular; 9-13 infralabials.

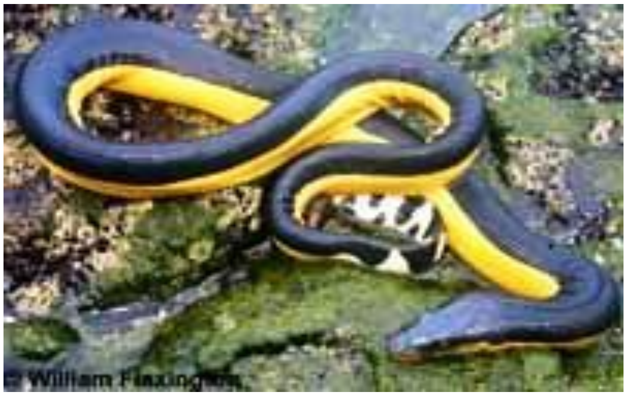


**Fig.11.26.** *Pelamis platurus* (Linnaeus).

4. Three subequal pairs of genials widely separated from each other.
5. Midbody scales 45-55, juxtaposed, quadrangular, smooth, in male lowest row with minute tubercles, anals 3-5, moderately enlarged.
6. Ventrals 47-63, indistinguishable from adjacent scales.
   Snout-vent length 880-900 mm, tail 83-100 mm.

*Colour*:
Dorsum light yellow to cream, ventrum pale, dorsum with 10-19-scale thick brown stripes. Head brownish. Tail with black and white bars or network.

*Habitat*:
It is a very pelagic snake, rapid, graceful and an agile swimmer. It is often cast onto sandy beaches, where it dies helplessly.

*Range*:
Persian Gulf westward to the Cape of Good Hope; eastward from coastal Pakistan to New Zealand, then northward to Possiet Bay, Kamchatka. In American waters it has been recorded from the Gulf of California to Ecuador.

### *14. Praescutata viperina* (Ph. Schmidt)
(**Fig.11.27**)

1. Head short, wide, distinct from neck, body moderately thick, posteriorly laterally compressed, rostral with three short rojections fitting into chin grooves.
2. One, rarely 2 preoculars, 2, occasionally 1, postocular.
3. Two anterior, 3-4 posterior temporals.
4. Supralabials 6-7, third or fourth, or both touching eye.
5. Infralabials 7-8.
6. Genials distinct, subequal, not touching each other.
7. Midbody scales 36-50, smooth, or with short keel, juxtaposed.
8. Ventrals 233-280, anterior-most about half the width of neck, decreasing in size, until at vent about the size of adjacent scales, 4-5 enlarged preanals.
   Snout-vent length 642-650 mm, tail 74-80 mm.

*Colour*:
Dorsum greenish white, with a median series of

24-34 rhomboidal blotches, fused at midline. Head dark, labials and neck whitish, tail black.

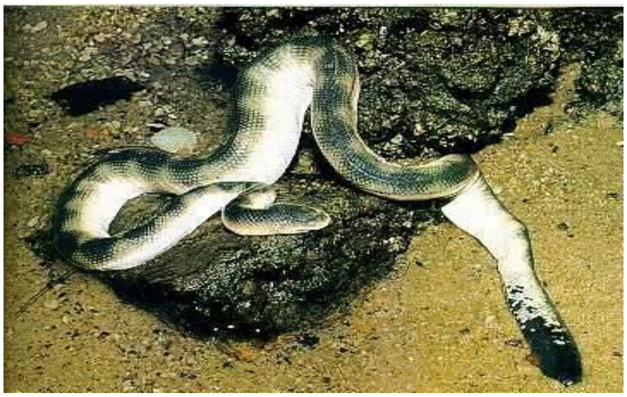


**Fig.11.28.** *Praescutata viperina* (Ph. Schmidt).

*Habitat*:
This species has been recorded from tidal creeks, several miles from the open sea.

*Range*:
From Persian Gulf along Makran coast, around coastal India to southern China, thence to Borneo and Java.

# APPENDIX

## Scientific, common English and Urdu names

| | | | |
|---|---|---|---|
| ***Bungarus caeruleus caeruleus*** (Schneider, 1801) | Krait | *Sangchoor* | سنگچور سانپ |
| ***Bungarus sindanus razai*** M.S. Khan, 1985 | South Punjab Krait | *janubi Punjab Sangchoor* | جنوبی پنجاب سنگچور سانپ |
| ***Bungarus sindanus sindanus*** Boulenger, 1847 | Sindh Krait | *Sindh Sangchoor* | سندھی سنگچور سانپ |
| ***Naja naja*** (Linnaeus, 1758) | Black Cobra | *Sheesh nag* | شیش ناگ سانپ |
| ***Naja oxiana*** (Eichwald, 1831) | Brown Cobra | *Bhoora nag* | بھورا ناگ سانپ |

| | | | |
|---|---|---|---|
| **Family Viperidae** | Viper Snakes | *Afi* | افعی |
| *Daboia russelii russelii (Shaw & Nodder, 1797)* | Russell's Chain Viper | *Koriala saamp* | کرڑیالا سانپ |
| *Echis carinatus astolae Mertens, 1969* | Astola Viper | *Astola khappra* | اسٹولا کھپرا |
| *Echis carinatus multisquamatus Cherlin, 1981* | Waziristan Viper | *Waziristan khappra* | وزیرستانی کھپرا |
| *Echis carinatus sochureki Stemmler, 1964* | Sindh Valley Viper | *Sindh khappra* | سندھ وادی کھپرا |
| *Eristicophis macmahonii Alcock & Finn, 1897* | Leaf-nose Viper | *Titli-naak Afi* | تتلی ناک افعی |
| *Macrovipera lebetina obtusa (Dwigubsky, 1832)* | Levantine Viper: | *Romn Afi* | بجیرہ روم کا افعی |
| *Pseudocerastes bicornis Wall, 1913* | Two-horned Viper | *Du-singha Afi* | دوسنگہ افعی |
| *Pseudocerastes persicus (Duméril, Bibron, & Duméril,* | Iran Viper | *Irani Afi* | ایرانی افعی |
| **Family Crotalidae** | Pit Viper | *Hafrai Afi* | ہفرعی سانپ |
| ***Gloydius himalayanus (Günther, 1864)*** | Himalayan Pit Viper | *Himalayai Hafrai Afi* | ہمالیائی ہفرہ افعیٰ |

# Chapter 1

# Collection and Preservation of Amphibians and Reptiles

Introduction ........................................................ 1
Collection ........................................................... 2
Killing and Fixing .............................................. 5
Storage ............................................................. 6

## INTRODUCTION

While going around animal collections in Biology Museums in different education institutions in Pakistan, author has observed several reptilian specimens ruined due to improper preservation techniques. Abdominal region of the specimens is destroyed due to bacterial activity, thick parts of the limbs are abnormally swollen. Preservation of reptiles for museum display or research work involve special methodology. Present paper outlines special instructions necessary for collection, preservation and storage of the herpetological material for scientific study and museum display.

There is yet no adequate reference depository in Pakistan where reference specimens are available for comparison and new material can be deposited with an assurance that it will not be lost. Recently established (1976) Pakistan Natural History Museum, Islamabad, is still in formative stages (Mufti, 1997). Thus these working conditions necessitate building and maintaining personal collections by individual workers, who collects according to his or her research interest throughout life and wants to maintain it healthy for long time.

## COLLECTION

Before starting to work on amphibians and reptiles of an area, familiarise yourself with already known species from the area. It is advised to collect pertinent literature, meet people already working on the animals of your interest. You can gain important information by discussions and know about the types of animals you are expected to encounter in field. A timely advise may change your planning altogether, guiding you in your collections.

There are three ways to build a good representative herpetological collection:

By picking up road-killed animals, which may be rare and most wanted species. The picked animal should be cleaned of roadside debris and adhering ants and preserved by the method suggested in this chapter.

Acquaintance with personnel of departments of wildlife, agriculture, forest, and teachers of local schools are of great help in building a good collection. They are provided containers with preservative and are requested to put animals killed in their locality in these containers. In this way, material from far flung areas can easily be obtained. Otherwise, time and financial constraints jeopardise year-round collecting from remote areas.

Field collecting trips are the most desirable way to obtain specimens. To ensure a large collection of animals a team of three to four members should be arranged. These trips give firsthand knowledge on habits and ecological data and give firsthand knowledge of their activity and ways of life. However, a field trip entails careful planning, pin pointing the areas from where collection is intended. All potential needs which may arise in field should be anticipated A badly arranged and managed collection tour always ends in disappointment for its participants.

The collection should be as representative of an area as possible. While engaged in field activity, diurnal and nocturnal as well as dawn and dusk periods of animal activity should be kept monitored to ensure collection of as many species as possible.

Field work is a great teacher, it teaches how to collect and where to look. However, a few tips for beginners are given in the following section.

### Collection Tips

Amphibians are best collected at night at their breeding sites. They are spotted by torch-light which does not disturb them. They are caught by hand or a hand-net. Small species like *Microhyla ornata*, *Uperodon systoma, Limnonectes limnocharis* and *L. syhadrensis* are best collected by spotting the calling male that perches well away from water, in the marginal grass or other vegetation and are very agile hoppers (Khan and Malik, 1987).

During day amphibians are a bit harder to capture. They may be found by turning stones, logs, debris and leaf-litter, searching along marginal grass along ponds, puddles, and streams, and looking into holes, crevices and fissures in ground. However, at night frogs gather under light posts feeding on photophilic insects and can easily be caught by hand or with a hand-net. Care should be taken not to leave the captured animal in a net, since the captured animal widens net-mesh and sneak out.

Majority of lizards and some snakes are diurnal, become active three to four hours after dawn, and are exceptionally agile. Any disturbance around may drive them into burrow. To extract an animal from burrow is really a difficult and laborious job. Lot of careful surveillance is needed to locate a reptiles in field. While in field, always keep in mind that your movements should look as non-threatening as possible, so move slowly and deliberately. Use your full visual field, observe without turning your head. Most reptiles are located by disturbing bushes and grass or looking under cover such as rocks, logs, leaf litter, bark of trees, trash and other debris. They may be found in crevices and holes in walls, among stones, and in hollow logs.

When you locate a lizard, keep it in your view without directly looking at it. Look unconcerned while approaching it as closely as possible. Now you must decide, how best to get it by grasping it with hand, or giving it a blow with your stick. Grasping with bare hand through branches of thorny bushes should always be avoided. Nocturnal lizards (mostly gekkos) are spotted in torch light on walls, boulders, rock outcrops, or holes in the ground, from where it can safely be caught by hand.

Remember, while in field look as unobtrusive as possible, make no extra movements, walk slowly, looking for any animal movement around you, use your full visual field without turning your head. All the animals hiding from you are keenly observing your movements. Any provocative movement, on your part may derive them in their hideouts. More agile reptiles are located from a distance, preferably before they see you. Observe keenly any movement among vegetation including branches of bushes touching ground. When you have located an animal, keep it in view and approach it as closely as possible. When it is within striking range, give it a powerful blow with the stick. The most active lizards that do not allow a close approach can be shot by an air-gun or stunned by a strong rubber band or rubber sling. To catch one with hand requires a good control of one's wits and takes time. Collection of diurnal reptiles requires lot of patience and some luck. In one locality, a species may be hard to collect, while in another area it may be an easy catch. While turning over rocks, stones, logs, leaf litter etc, care must be taken to use some tool, or protect your hands with heavy gloves. Scorpions and poisonous snakes often hide under these objects.

Nocturnal geckos and snakes are active just after sunset. Geckos are located by looking, in torch light, under bridges and on walls of inhabited houses. Snakes are found along road sides, around human habitations in urban areas, and around ponds and puddles in warm nights. Areas recently watered are often visited by snakes in warm nights.

Many desert lizards are diurnal, they are located and caught easily if there is no cover around. Nocturnal desert gekkos and snakes are spotted by torch light. By day, their tracks lead to their burrows from which they can be extracted.

Things related to animals are of great importance in subsequent taxonomic and ecological studies. They include eggs, egg-shells, larvae, juveniles, broken parts of body, food items, tracks on soil and record of vocalisation.

Most reptiles are best collected by grasping with bare hand. However, large varanids are caught in such a way that animal’s sharp teeth and claws are best avoided. They are grasped from neck along dorsal side with one hand, and with the other from the anal region, so that mouth and claws face away from your body. Turtles and tortoises are caught from the sides of their shell, avoiding contact with claws. Large live lizards and turtles are carried in sacs of firm-material.

Most lizards autotomize their tail during capture, do not discard the broken tail, tie it securely with the specimen, since tail characteristics are of great help in specific determinations.

Extra care should be taken in handling snakes. Colubrids are rarely encountered in field since they are very quick to escape. However, when cornered, some colubrids coil and attack and hiss loudly. Almost all poisonous snakes prefer to lie coiled to escape detection. A coiled snake is easy to handle. For beginners it is advised to kill the snake, by giving a strong blow at mid-section of its body, and wait until it is motionless. Do not smash it's head, its characteristics are important in specific determinations. To ensure death of a snake, turn it in supine position (belly up), if it remains so for 5-10 minutes than it is dead. Often biting reflexes, in an apparently dead snake, persist, so do not handle an apparently dead snake carelessly, always avoid its head.

Catching a live snake is always risky. Even experts are bitten, so avoid it in field. Special sticks to catch live snake are not available in Pakistan. I use the following technique: press snake's head against ground with a strong, half a meter long stick, then grasp it firmly from just behind its head, with your right thumb and fingers, so that the snake cannot turn its head sideways to bite. I do not recommend this method for beginners, they should handle only a dead snake. Catching a live wild cobra is avoided even by experts, it should always be killed first.

Putting a live snake in a collection bag, demands extra care. The cloth bag is held open in left hand, the snake is lifted, held in right hand, well above so that its tail could first be lowered into it. As hand holding snake's head is well down in the bag, the grip is released and hand is quickly withdrawn out of the bag which is snapped close tightly with both hands. The bag is firmly tied with a strong cord. Extra precaution is taken by bending over the tied end of the bag, and tying it double. Bags with living snakes should be handled with care, body contact should be avoided, bags preferably should be carried by holding at the tied end or by the cords, for snake may bite through the bag.

Small lizards are put into plastic bags and tied. In hot weather animals should not be kept for long in plastic bags as they will die and rot.

### Field Collecting Equipment

Every team member should be provided with a set of equipment in an appropriate sling bag. The following items should be included:

1. A strongly bound notebook for recording data.
2. Good quality pencils, ball-point pens, sharpeners, erasers, measuring tape, a penknife, a spool of thread and needles.
3. Good quality torches with spare dry cells and bulbs.
4. A strong walking stick 1.5 m long and 20 mm thick.
5. A hand-net and tea strainer for catching aquatic animals.
6. A Plastic jar with capacity of about 500 ml for frog tadpoles and soft-bodied small frogs and reptiles.
7. Strong cotton sacs of different sizes with strong strings.
8. Strong 40 mm long and 20 mm wide clear plastic bags with double sealed end, for keeping small reptiles. These bags are handy and weightless and are secured by knotting the open end.
9. A pair of Large forceps or tongs to handle obnoxious animals and extract animals from crevices and holes.
10. A whistle that can help team members to locate each other when they become separated. At night a torch may also serve this purpose.
11. A field camera with flash gun.
12. A thermometer and a hygrometer.

### Recording Field Data

Following methodology, to record information pertaining to every collected animal, is important. A specimen without field-data is scientifically useless. The information should be recorded on the spot. Memory should not be trusted as you may later fail to recall important information.

1. Assign an identification code number to each collection tour and mark a part of your notebook accordingly.

2. Assign a collection number to each specimen. Write it on a tag with lead pencil and tie it to a leg of the specimen or around midbody in case of snakes.
3. Enter the following data in notebook referring to its tag number:
    i. Date of collection: day-month-year.
    ii. Time of collection: using a 24-hour clock.
    iii. Locality where collected. Be as specific as possible. Give district, province, distance and direction from nearest town on standard maps. Give name of mountain, highway, river, or canal if appropriate.
    iv. Record ecological data: habitat where animal was found, elevation above sea, temperature/humidity.
4. Name of collector.
5. Take a colour photo of every specimen collected. The habitat in which it was found should be shown. Sometimes a series of photos may illustrate locomotion, breeding, feeding habits of the animal.

## KILLING AND FIXING OF MATERIAL

Preservation of scientific specimens involves killing and fixing and storing it properly. Specimens must chemically be treated to ensure proper preservation of their different body parts in a natural shape as possible, to facilitate later detailed scientific study. In the field it is essential to carry all liquid chemicals in well stoppered, strong plastic bottles.

Concentrated (40%) formalin buffered with calcium carbonate is a good, economical preservative for field work.

Plastic trays with lids are needed for fixing and hardening specimens.

A two meter length of muslin cloth twice the width of the tray is needed.

Syringes (20-50 cc) and needles (16, 20 and 25 g) are required injecting specimens.

### Amphibians

Amphibian skin is permeable and readily absorbs killing agent. Adults, eggs and larvae are put directly in 10% formalin until dead (Khan, 1965, 1982a, 1982b). There are several other killing agents such as chloreton, procaine hydrochloride and barbituates that as equally good but are not readily available in Pakistan and are more costly.

### Reptiles

Lizards and snakes are killed by injecting concentrated formalin at the site of heart, which is at mid-chest in lizards, and about two head lengths from the anterior end of the body in snakes (Fig. 1 A, B, C). Turtles are injected with concentrated formalin at sites indicated (Fig.1B). Moderate pressure on shell will cause these parts of body to come out. To preserve viscera, formalin is injected deep in the body using special long needles.

### Fixing

A plastic tray is prepared for fixing by folding and spreading half of the piece of muslin cloth at the bottom of the tray. Sufficient 10% formalin is poured into the tray to soak the cloth.

#### Amphibians

The frog is taken out as soon it is dead and placed belly down in the fixing tray. Limbs of the animal are folded in natural position. The animal is covered with the other half of the muslin cloth, wetted with 10% formalin, then the tray is covered. The specimen is left for hardening for 6-12 hours.

#### Reptiles

The scale-covered, hard skin of reptiles is impermeable to preservatives. So that the animals are fixed by injection of preservative. Concentrated formalin is injected in the body cavity to preserve viscera. Large lizards require injection into other parts of the body also (Fig.1A). If a syringe is not available, a cut in the mid-abdomen of lizard helps penetration of the preservative. Snakes are injected at 4-5 cm intervals along the whole length of belly and tail (Fig.1D). Moderate pressure at the base of the tail of a freshly killed lizard or snake everts its hemipenes. Hemipeneal morphology is very helpful in taxonomic determinations. Injection of formalin at the tail base also serves to put pressure to evert hemipenes and harden them at the same time (Fig.1D).

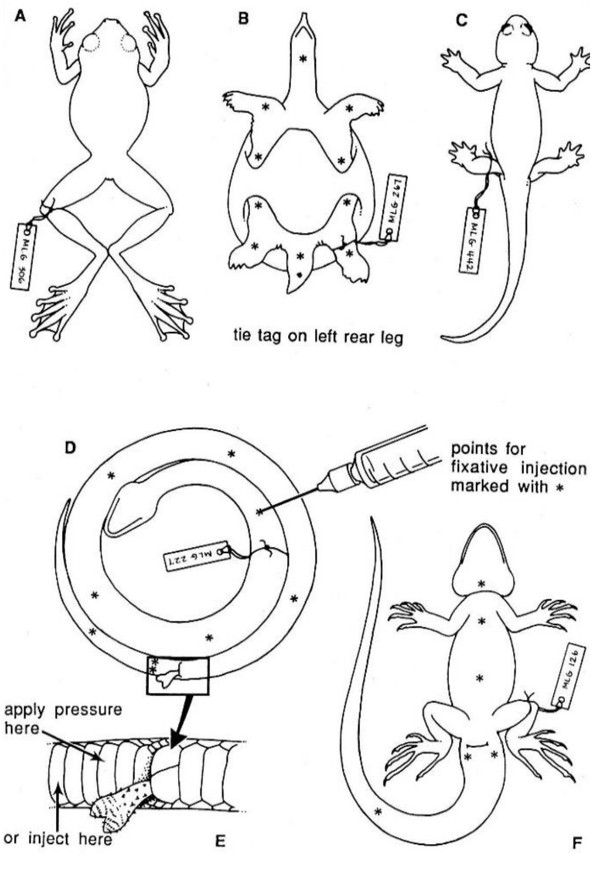


**Fig. 1.** A, Frog; B, Turtle; C, Lizard; D, Snake. Injection sites (*) of preservative, and hardening postures of animals desired for scientific study. The figures also show position of tags with specimen number. E shows extruded hemipenis.

Dead lizard is placed belly down, in the fixing tray. Its legs are folded in natural position, soles facing down and digits are evenly spread. The tail is bent on the left side. The cloth is folded over the animal and sprinkled copiously with concentrated formalin and is left for 6-12 hours. Fixing a snake involves coiling its body after injection according to the size of the storage container. After formalin injection it is covered, as usual, with formalin-wetted muslin cloth and left for 12-24 hours depending on the size and bulk of the snake.

## STORAGE OF MATERIAL

Fixed and hardened specimens are stored in air-tight plastic jars. Caution should be taken not to pack too many specimens in one jar. Over-crowding and too little preservative in the container may distort and ruin the specimens forever.

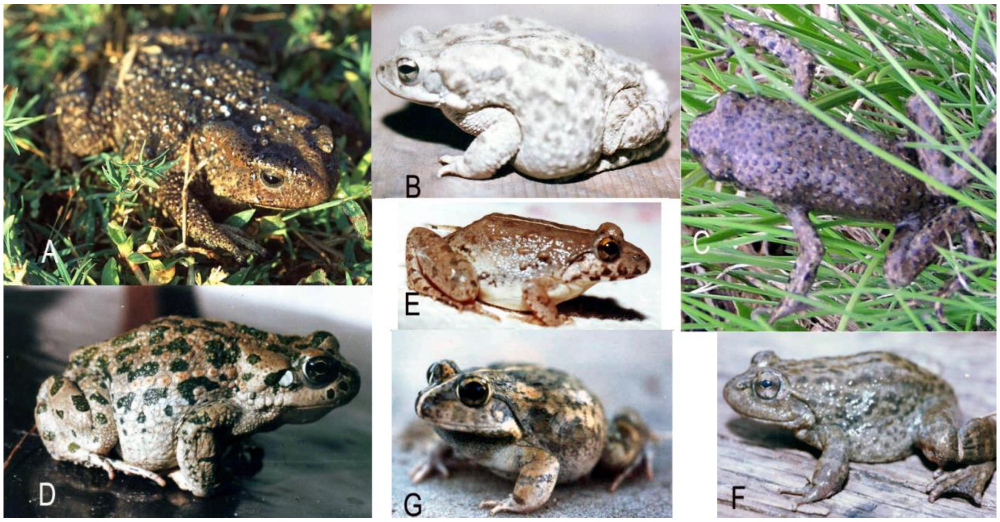
Jars with specimens should be transported from field carefully. Each jar should be marked with a number, which should be recorded in the data-book. While loading the jars on transport, ensure that every jar is loaded in a secure place. During journey to laboratory, care should be taken, that none of them is damaged. On reaching destination make sure that every jar is unloaded and placed safely.

### Museum Display

Adult animals with all body parts in contact and in good condition, are to be selected for museum display. A clear transparent glass jar, 20-30 mm longer and wider than the specimen, should be selected as container. It should have fairly tight stopper. If the body of the animal is weak, i.e., it cannot stay vertical in the jar, support it by tying it to a glass strip. The jar is filled with 7% formalin, the animal is lowered in it and sealed. The displayed jars should be surveyed time after time. Evaporated preservative should be maintained regularly.

# PART-I

## AMPHIBIA: TOADS & FROGS



| | |
|---|---|
| A | *Duttaphrynus himalayanus* |
| *B* | *Bufo stomaticus* |
| C | *Scutiger nyingchiensis* |
| D | *Pseudepidalea zugmayeri* |
| E | *Fejervarya limnocharis* |
| F | *Allopaa hazarensis* |
| G | *Sphalerotheca breviceps* |

# Chapter 2

# An Overview of Amphibians in Pakistan

Introduction........................................................9
Tropography.......................................................9
Hydrology and Climate...................................10
Vegetation and Habitats..................................10
The Amphibian Fauna.....................................10
Threats to Amphibians in Pakistan .................16

## INTRODUCTION

Pakistan is relatively a small country. Located in the northwestern corner of the Indian Subcontinent with an area of 796,095 km$^2$ stretching between longitudes 60° 52' to 75° 22' E, and latitudes 24° to 37° N, at the confluence of three mighty mountain ranges, the Himalayas, Karakoram, and Hindu Kush. Its complex geological history and proximity to the mighty mountains its terrestrial panorama changes every few kilometers. So that Pakistan is known as “the land of contrast of habitats,” in terms of geographers “land of many lands" (Ahmed 1951; Mufti *et al.* 1997; Khan 2006).

## TOPOGRAPHY

Three-fourths of the terrain is mountainous, littered with plateaus and valleys at different elevations, with different ecological formations from sea level to more than 6,000 m elevations. The Himalayan great rampart overlooks the vast Indo-Gangetic Plains extending in the west as Indus valley.

*The Indus Valley*: It is 25.9 million hectares of undulating undisturbed plain, stretching from the Shiwaliks at the foot of Himalayas to the shores of the Arabian Sea. The upper part-Punjab Plain is traversed by the Indus River and its four tributaries, Jhelum, Chenab, Ravi, and Sutlej. The world's most elaborate artificial canal system has been excavated to irrigate vast arid tracts running along the Indus Valley (Khan 1980). The rivers meet at Panjnad in southern Punjab and continue southward as the Indus River draining into the Arabian Sea in the south. The Plain is nearly featureless, though elements of microrelief assume great importance in relationship to flooding, irrigation and delineation of niches, four permanent deserts are interspersed between rivers.

## HYDROLOGY AND CLIMATE

Pakistan is water deficient country. The Indus Valley is the water shed of the Himalayas. The rivers are heavily silted; they overflow during summer monsoons converting disrupting roads and railways, inundating villages and cities, and destroying cattle and crops. A series of world-recognized Ramsar wetlands fed by the seepages and floodwaters, run along the river courses.

Pakistan is geographically located at the western margin of the Monsoon Regime, its climate is more continental than that of other parts of the subcontinent. Climate of different parts of the country vary according to special local ecological conditions.

Hot conditions extend from the Indus Plains to southern and western Baluchistan, while warm are generated from a marked maritime effect extending over a narrow coastal strip. In the northern mountains, there is a progressive cooling with increasing elevation, with mild conditions restricted to lower elevations, while temperatures constantly below freezing and with heavy snowfall throughout most of the year at the highest ones. The continental effect accentuates seasonal differences in temperatures in the interior of the country compared to the Arabian Sea coast (Khan, 2002a).

Himalayas have played an important role in shaping the geology, hydrology, and seasons of the subcontinent. The barometric vacuum created over the subcontinent, attract saturated winds from the sea. The frequency and amount of rainfall is variable from year to year and from place to place. Average annual rainfall decreases from east to west, from approximately 1,500 mm at the lower Ganga and Brahmaputra valleys in India, to 600 mm delivered in the upper part of the Indus Valley in Pakistan. Rainfall also decreases from north to south; during monsoons, the average rainfall on the Indus Plain decreases from 1,300 mm in the northern hilly tracts to 120 mm or less in the south. The sub-Himalayas or Siwaliks humid subtropical conditions are maintained through most of the year and provide ideal conditions for amphibians.

The post-monsoon season extends from October to mid-December. It is a transitional period between the monsoon regime and winter. The temperature gradually falls from 35°C in October to below 10°C by December. Due to the absence of active rain-bearing winds, October and November are the driest months.

## VEGETATION AND HABITATS

The habitats of Pakistan include vast coastal beaches, lagoons and mangrove swamps; sandy rolling deserts and desolate plateaus; fertile plains; freshwater lakes and wetlands; dissected uplands in the middle and high mountains with plateaus, desolate valleys, snow-capped peaks and eternal glaciers. Khan (1999a) classified the major habitats in terms of vegetation and topography and Table 1 in that publication lists those, along with the most characteristic species of amphibians inhabiting them.

## THE AMPHIBIAN FAUNA

### Origin

Pakistan is sandwiched between two main biogeographic regions, the Palearctic in the west and the Oriental in the east, which makes the study of its amphibian fauna particularly interesting to the bio-ecologists (Boulenger 1890; Smith 1931, 1935, 1943; Darlington, 1957; Minton, 1966; Mertens, 1969; Khan, 1980, 2002a, 2006).

Present worldwide distribution of amphibians is reflected in geo-historical processes of breaking and fusion of landmasses, and rise and fall in sea levels (Wallace, 1876, 1881; Darlington, 1957; Voris, 2000). The origin, history and distribution of amphibians in Pakistan and adjacent regions probably date back to the Cretaceous, about 200 million years ago, when the huge landmass of Gondwana fragmented. Its northeastern part broke away as the Indian Plate that drifted northward across the Indian Ocean, sweeping with it several small Islands and, ultimately colliding with the Eurasian landmass. The impact of the collision lifted up the trans-Himalayan ranges of the Hindu Kush, Karakorum, Himalaya, and the Pamir-Tien Shan, and the sub-Himalayan complex of Kohistan (Holmes, 1965; King, 1967; Courtillot and Vink, 1983). These geological upheavals also activated paleo-sutures in Eurasia; a series of complex mountain systems appeared, subdividing and genetically isolating populations of resident animals and plants (Axelrod, 1960; Sengör, 1984; Macy *et al.*, 1999). The present-day complex geomorphology and biodiversity of the region is due to continued mountain building and to changes in ecological conditions (Anderson, 1963; Khan, 1997, 1999b). Recent molecular studies (Mayer and Benyr, 1994; Macey *et al.*, 1999a bibliography has only 1999, 2000) support the hypothesis of a vicariant origin of the herpetofauna and its distribution in Eurasia and Southeast Asia.

By the Oligocene, extreme regions of temperature and precipitation developed in the south of the Indo-Gangetic Plains. Western Eurasian dryness extended onto the subcontinent. The subtropical temperate climate and low rainfall established vast tracts of grasslands as well as the Cholistan and Thar deserts (Ahmed, 1951). These provided habitat corridors allowing immigration of amphibians of North African, Central Asian and Southeast Asian origin into the drier habitats of Pakistan.

By the Pleistocene changes in climate and a corresponding rise and fall in sea level created new pathways for the two-way dispersal of species between Eurasia and the subcontinent (Prater, 1965; Wadia, 1966; Voris, 2000).

## Composition

Pakistani amphibians are a heterogeneous assemblage of 24 species (Appendix in Chapter-3), of which ten fall into three genera of the family Bufonidae (*Bufo* 2 species, *Duttaphrynus* 2, *Pseudepidalea* 6), one genus of the family Megophryidae (*Scutiger* 1) and two genera of the family Microhylidae (*Microhyla* 1, *Uperodon* 1), six of the family Dicroglossidae (*Allopaa* 2, *Chrysopaa* 1, *Euphlyctis* 3, *Fejervarya* 2, *Hoplobatrachus* 1, *Nanorana* 1) and one genus of the family Ranidae (*Sphaerotheca* 1). Wall's (1911) report of a "salamander" from the stomach of a water snake (*Xenochrophis piscator*) in Chitral, northern Pakistan, has not subsequently been authenticated. Perhaps it was a misidentified, half-digested tadpole of some brook frog of the genus *Allopaa* (Khan 1987; Khan and Malik 1987a. Khan (2011) reviewed the herpetology of Pakistani frogs.

## Distribution

Amphibians are distributed in Pakistan over elevations from sea level to almost 4,000 m although no individual species encompasses this entire range. Some species, such as *Bufo olivaceus*, *Pseudepidalea surda* and *Fejervarya syhadrensis* are restricted to relatively low areas, while others, e.g., *Duttaphrynus himalayanus*, *Scutiger nyingchiensis,* and *Pseudepidalea baturae* and are found only at the upper elevations. The remaining species have broad vertical ranges mainly in the low to middle elevations. *Bufo stomaticus* has the greatest vertical distribution, ranging from sea level to above 2,400 m.

Sclater's (1858) Zoogeographical Regions were characterized by the occurrence of relatively similar species in different regions. This sympatry resulted from long evolutionary interactions with changing ecology. The distributional ranges of almost all species of amphibians in Pakistan overlap at some points; sympatric amphibians share common food resources and space.

1. The Indus Valley

Throughout its wide range *Bufo stomaticus* is eurytopic and occurs in a number of habitats; at various places in the Indus Valley it is sympatric with *Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya limnocharis, F. syhadrensis, Hoplobatrachus tigerinus, Bufo olivaceus* and *Sphaeroteca breviceps.* Adults as well as tadpoles of these species utilize common resources in the riparian habitat.

The Balochistan olive toad, *Bufo olivaceus,* extends from the northern Himalayan foothills into the Indus Valley, but is rare and spottily distributed in the latter place. The dicroglossid genera *Euphlyctis, Fejervarya* and *Hoplobatrachus,* are typical plains forms from the Punjab riparian system. The burrowing ranid frog, *Sphaeroteca breviceps* descends into the plains and is spottily distributed along river courses (Khan 2006) and reaches the seacoast. The northern cricket frog, *Limnonectes limnocharis,* from the upper Indus Valley is replaced by *L. syhadrensis* in lower Indus Valley.

2. The Uplands

*Bufo olivaceus* and *B. stomaticus,* are wide-ranging species from the plains to the northern and western foothills; *Duttaphrynus himalayanus* and *D. hazarensis* are sub-Himalayan in distribution; *Pseudepidalea baturae, P. latastii,* and *P. siachinensis* are north-eastern Himalayan forms while *P. surda* and *P. zugmayeri* are south-western Baluchistan species. The Tibetan species, *Scutiger nyingchiensis,* extends into meadows and wetlands in northern Pakistan. The southern Asian ant-frog, *Microhyla ornata,* ranges from the Indus Valley into the sub-Himalayas but does not extend into Balochistan. The secretive microhylid, *Uperodon systoma,* is a subterranean species that has been collected from the Potohar tableland, in Islamabad, Pakistan.

The heterogeneous family Dicroglossidae is represented by seven genera, of which *Allopaa* and *Nanorana,* are torrenticole, inhabiting brooks in the northern sub-Himalayas. Another genus, *Chrysopaa,* inhabits the karez-channels characteristic of the Balochistan highland.

## Assemblages

Of the amphibians of the Indus Plain, *Bufo stomaticus* is the most eurytopic species, extending its range into different ecological situations from Myanmar, Bangladesh, Bhutan, Nepal, Sri Lanka, the whole of India and Pakistan, and southern Afghanistan and eastern Iran. It is a strong human commensal and is one of the most frequent animals met within human inhabitations.

In the northwestern mountains at 3,000 m, other species in the assemblage with B. *stomaticus* include *Pseudepidalea baturae, P. latastii, P. siachinensis, Scutiger nyingchiensis* and *Euphlyctis microspinulata.* Activities of the species in this group are confined to short summers, during which they feed and breed in terraced paddy fields and pools around springs, and torrents, while *Scutiger nyingchiensis* prefers grassfields and meadows with scattered vegetation and tufts of grasses between 3,000 m and 3,500 m elevation.

In the northern Himalayas, between 2,000 m and 3,500 m, the amphibian assemblage consists of Bufo *stomaticus, Duttaphrynus himalayanus* and *D. hazarensis*, the brook frogs *Allopaa barmoachensis, A. hazarensis* and *Nanorana vicina*, the skittering frog *Euphlyctis microspinulata* and *Microhyla ornata*. Mostly pools in the upper reaches of torrents are occupied by torrenticole frogs, while the other species frequent down-stream pools.

The amphibian assemblage in the Balochistan highland contains *Bufo stomaticus,* two species from karez pools, *Chrysopaa sternosignata* and *Euphlyctis microspinulata,* and several species (*Bufo olivaceus*, *Pseudepidalea surda* and *P.* zugmayeri) that invade these pools for breeding. All species of tadpoles develop in the karez pools.

## Speciation and Diversification

Pakistani amphibians are a heterogeneous assemblage of twenty-four species; ten fall in the family Bufonidae, one in Megophryidae, two in Microhylidae, ten Dicroglossidae, and one in Ranidae. Wall’s (1911) report of a “salamander” from the stomach of a water snake (*Xenochrophis piscator*) in Chitral, northern Pakistan has not been authenticated; perhaps it was a misidentified, half-digested tadpole of local brook frog of the genus *Allopaa* (Khan, 1987; Khan and Malik, 1987a).

The ten toads fall into three genera, *Bufo, Duttaphrynus* and *Pseudepidalea. B. olivaceus* is a lowland form extending up to 200 m, while *B. stomaticus* is a widely distributed plains form extending up to 4,000 m in the northern and western foothills. The two broad-skulled toads *Duttaphrynus himalayanus* (2,000-3,000 m) and *D. hazarensis* (1,000-2,500 m) are Himalayan and sub-Himalayan in distribution. *Pseudepidalea baturae, P. latastii*, and *P. siachinensis* are highland, north-eastern Himalayan (2,500-3,600 m), while *P. surda* ranges from 500-1,000 m in Balochistan and *P. zugmayeri* is wide ranging (400-2,000 m).

The highland Tibetan genus *Scutiger* (family Megophryidae) is represented by a single species *S. nyingchiensis* in northeastern Pakistan (2,000-3,000 m); recently it has increased its range considerably westward. There are two microhylid species. The common ant-frog *Microhyla ornata* ranges widely from the subHimalayas throughout the Indus Valley (200-2,000 m), while the secretive *Uperodon systoma* is subterranean; it was recently discovered from the bed of a stream near Islamabad, Potohar tableland, Pakistan (500-1,000 m).

Ten species of Dicroglossidae fall in seven genera: two brook frogs *Allopaa barmoachensis* and *A. hazarensis* inhabit the Shiwalik Range (800-1,400 m), while *Nanorana vicina* frequents brooks at lower elevations (1,000-1,200 m). The Balochistan karez frog *Chrysopaa sternosignata* abounds in the karez-channels (1,000- 1,500 m.

The dicroglossid frogs, *Euphlyctis cyanophlyctis* (50-2,000 m), *Fejervarya limnocharis* (200-1,500 m), *F. syhadrensis* (150-1,000 m) and *Hoplobatrachus tigerinus* (50-1,500 m) are typical plain’s forms, mostly populating Punjabi riparian systems and wetlands in the foothills of the Himalayas.

## Life History and Ecology

Although some species from the plains are mid-monsoon breeders (Khan and Malik, 1987b), most are pre-monsoon breeders; when summer begins in early March, swamps, irrigation channels, canals, seepage pools, puddles and irrigated fields are invaded and calling groups are formed. Nearly every depression that can hold water teems with tadpoles.

During the summer monsoon rains, the flooding water carries breeding animals and tadpoles far and wide in the valley, where they colonize new sites and places. After the rains (October-November), however, water rapidly recedes and rivers return to their bounds.

Smaller ponds and puddles dry, destroying tadpoles. Few sites retain water long enough to allow tadpoles to successfully metamorphose (Khan, 1980, 1999b, 2006).

Khan and Malik (1987b) and Khan (unpublished data) followed meteorological changes in Punjab, Pakistan, for the years 1979-1981 and 1983-1999 to study the effect of weather on the reproductive activity of sympatric amphibians species. Activities were monitored in natural ponds, puddles and irrigated fields falling within a radius of 1 km from Rabwah City (long. 72.085 °E, lat. 31.045 °N). It was concluded that time and duration of rainfall affects intensity of reproductive activity through its effect on air temperature. Of the period 1979-1981, 1979 was the **r**ainiest, in the sense that total 318 mm of rain was distributed almost evenly throughout the year. The resulting uniform temperature positively affected reproduction, since water at breeding sites was continuously replenished and every species enjoyed ideal conditions for activity and oviposition. In that year, ponds and puddles teemed with tadpoles that successfully metamorphosed.

In 1980 most of the total rainfall of 280 mm was deposited in February-March (148 mm) and was utilized by the early-breeding species *Bufo stomaticus, Euphlyctis cyanophlyctis* and *Hoplobatrachus tigerinus.* That year was hard on monsoon breeders because of meager monsoonal rainfall; some sites dried, killing tadpoles, although those in permanent ponds metamorphosed. By the time heavy downpours came in late August, breeding animals were already spent. Winter started early because heavy rains lowered air temperature to 8°C, thereby curtailing amphibians' activities prematurely.

The year 1981 remained dry for pre-monsoon breeders (March-May), who used channels, seepage pools, irrigated fields and ponds in the suburbs of towns and cities. A total rainfall of 249 mm was concentrated in the monsoon season (July-August). July rain was utilized by the monsoon breeders, but many died in early August because a thunderstorm lowered temperature to 8°C. When temperature was restored to 15°C in mid-August a few breeding groups were observed.

1. Calling Sites

*Bufo stomaticus, B. olivaceus, Hoplobatrachus tigerinus, Euphlyctis cyanophlyctis* and *Sphaerotheca breviceps* call together from the margins of ponds and puddles while highland *Scutiger nyingchiensis* call individually, hidden in meadow vegetation or from under boulders. *Microhyla* and *Fejervarya* are mid-monsoon breeders that start calling by nightfall; males are widely spaced and perch above the surface of the water where they are hidden in vegetation. They usually prefer an elevated piece of land surrounded by shallow water as a calling site, where they sit camouflaged among roots of grasses. Brook frogs, *Allopaa* and *Nanorana*, call from perches on scattered stony slabs while *Duttaphyrnus* call from vegetation along the banks of brooks.

2. Oviposition

Amplectic pairs retreat to relatively calm, deep water, where oviposition takes place. Female toads, carrying male on their backs, swim at depth and wind double gelatinous strings of eggs around submerged vegetation (Khan, 1965). Other species from the plains lay their eggs in small bunches in shallow marginal water, where the eggs are disassociated from each other by the movements of the amplectic pair and stick to grass blades (Khan, 1982b). *Sphaerotheca breviceps* deposits a thin gelatinous film of eggs that floats at surface of the water. The tiny eggs of *Microhyla ornata* are laid in a translucent gelatinous mass at the water's surface (Khan 1982a, 1985). The large eggs of brook frogs are enclosed in spherical jelly capsules that adhere to vegetation and the stony walls of pools and *Scutiger* oviposits under logs and stones in minor streams and pools.

3. Tadpoles

Tadpoles have a globular body, antero-ventral suctorial mouth, sharp beak surrounded by rows of denticles and papillae, antero-dorsal eyes, long muscular tail with dorsal and ventral broad fins. Species differ in minor details. Microhylid tadpoles are transparent with a streamlined body, broad-finned, long tail with vibratile terminal filament, anterodorsal non-suctorial mouth they are nectic-lentic, microphagous filter feeders (Khan, 1982a; 2000). *Bufo* tadpoles are black and smaller with globular body and weaker tail, narrow tail fins; the oral sucker has a typical karatodont formula of 2(2)/3. Dicroglossid tadpoles are relatively large and drab in colour; the body varies from globular to cylindrical, with a long, muscular tail, muscular, spotted with broad black fins. The oral sucker is well developed. The species have different karatodont formulae: *Fejervarya limnocharis* 2(2)/3, *Euphlyctis cyanophlyctis* 1/2, *Hoplobatrachus tigerinus* 5(4+4)/(3+3)5, *Allopaa hazarensis* 8(7)/3(2), and *Chrysopaa sternosignata* 5(4)/3 (Khan 1982a, 1987, 1996a,b; 1999b; Khan and Mufti, 1994a).

*Allopaa* and *Scutiger* overwinter as tadpoles with large deposits of fat (Dubois and Khan, 1979; Khan and Malik, 1987b).

Each species of tadpole has specific ecological preferences and is confined to a distinct microhabitat. Toad tadpoles are benthic-littoral in early stages and their schools swim in shallow marginal water at the soil-water interface. In later stages, they become profundal and are macrophagus raspers. *Fejervarya limnocharis/syhadrensis* tadpoles are lentic-littoral, preferring seepage pools with moderate planktonic bloom and are microphagus as well as macrophagus raspers (Khan, 1996a). *Euphlyctis cyanophlyctis* is lentic-profundal, prefers permanent ponds with little or no vegetation, confines its foraging to the bottom of the pond, rarely comes into the upper layers, and is macrophagus detritivorous (Khan and Mufti, 1995). *Allopaa* and *Chrysopaa* are lentic-profundal, prefer ponds with clear water in the bed of torrents, are macrophagus, herbivorous, and forage on the bottom (Khan and Malik, 1987a). *Microhyla* are lentic-nektic, swim in schools at midstream, and feed by filtering suspended microorganisms from the water (Khan 2000). *Hoplobatrachus tigerinus* is lentic-profundal and carnivorous in habits, lolls at the bottoms of ponds and watches for movement in the upper layers; it occasionally darts to grab passing tadpoles (Khan, 2004a).

Gut content analysis show that each species of tadpole is specific in its choice of quality and type of food (Gosner, 1960; Belova, 1964; Khan, 1999b). The size of food item eaten is related to the tadpole species' specific orpharyngeal apparatus (Khan, 1991). Diet does fluctuate markedly over time, however, in the temperate Indus Valley. As an adaptation hastening development and successful metamorphosis, each species gathers as much food as possible. Even primarily herbivorous tadpoles resort to carnivory in a rapidly drying pool, thereby shortening the time to metamorphosis. The tadpole of *Hoplobatrachus tigerinus* is facultatively predatory on sympatric tadpoles, and accordingly has modified jaws and multidental labial rows of conical teeth that pin down the body of its struggling pray. It uses its strong, sharp jaws to cut large chunks from the body of its victim (Khan, 1996b, 1999b, 2004a). *Euphlyctis cyanophlyctis* usually feeds at the bottom of ponds on detritus containing bacteria and remnants of plants and animals. Under critical environmental conditions, however, it supplements its diet by preying on sympatric tadpoles (Khan and Mufti, 1995).

By mid-monsoon, elevated temperature and high nutrient content encourage rapid growth of plankton in ponds and the water turns green. This usually coincides with breeding in *Fejervarya limnocharis/syhadrensis* and *Microhyla ornata*, so that when their tadpoles appear they have sufficient plankton on which to feed. Unlike stenophagous *M. ornata* tadpoles, however, *F. limnocharis/syhadrensis* are heterophagous, feeding by scraping material from surfaces as well as by filtering plankton (Khan, 1996a; 1999b).

4. Adults

Most adult amphibians are similar in diet, eating mainly insects, worms, and sometimes other anurans. They differ, however, in reproduction (see above), choice of habitat, and method of feeding (Khan, 1999b, Khan and Malik, 1987b).

Toads have a relatively broader spectrum of choice of habitat, are more terrestrial than many frogs, and extend from sea level to alpine habitats. They are commensals of humans. At dusk they swarm from their daytime retreats and to lighted parts of houses and around light posts to catch insects and other prey attracted to the lights (Khan, 1965, 2001a ). *Scutiger nyingchiensis* is associated with alpine streams in moist, forested areas, and temperate/ subtropical/tropical seasonally wet/flooded grassland at high elevations (Khan, 2005).

While frogs extend from sea level to sub-montane regions, they are relatively secretive, seldom seen in and around human inhabitations. The skittering frog *Euphlyctis cyanophlyctis* is resident in almost every pond and puddle where it croaks while afloat (Khan, 1991, 1997a; Khan, and Mufti, 1995). In Balochistan *Chrysopaa sternosignata* and *Euphlyctis microspinulata* are resident in Karez pools (Khan, 1987). *Allopaa barmoachensis*, *A. hazarensis* and *Nanorana vicina* are resident species in the northern mountains, where they rest on stony slabs jutting from the sides of pools in brooks (Dubois and Khan, 1979; Khan and Tasnim, 1989).

## THREATS TO AMPHIBIANS IN PAKISTAN

### Habitat Destruction

The Indus Valley is the most populated and cultivated part of Pakistan. It was formerly grassland with extensive tracts of thorn forest; along watercourses there was thick riverine forest. Reclamation of land, however, has entirely changed the natural complexion of the valley. The region was converted into the main grain-producing area in the country. Most of the riverine forests were felled and the original fauna destroyed (Khan, 2006) although thorn forest still survives in small pockets in areas where human interference is restricted, such as airfields, graveyards, and unattended tracts of land. The cleared valley is now a dry Savannah, with patches of scattered wetlands, shrub and grasslands. Irrigation channels, seepage pools, ponds, puddles, and water reservoirs provide patches of moist refugia for local frogs and toads.

Although loss of habitat has been detrimental to amphibians, not all human activity has been harmful. There has been habitat creation as well as habitat destruction. Some reclamation of wastelands created amphibian-friendly habitats; areas from which no frogs were previously recorded, now abound in frogs and toads. Permanent ponds and puddles, created by digging of soil for construction purposes, are almost a regular feature in low-lying suburbs of nearly every Pakistani city and village. Rain and refuse water continuously fills these to form permanent bodies of water. Thick growths of diverse vegetation along their banks provide shade and creating an ideal environment for local amphibians. High temperatures and the nutrients washed into these ponds encourage development of weeds and plankton, thereby creating favourable conditions for various species of tadpoles (Khan, 1990).

### Agriculture

The increased demand for agricultural products as a consequence of extensive growth in human populations has affected amphibian populations all over the world. Khan (1990) pointed out several anthropogenic factors affecting amphibian populations in Pakistan.

Amphibians take refuge in holes and crevices in and around tilled fields. Ploughing of agricultural land was formerly carried out by oxen that moved slowly, thereby providing amphbians ample time to hop away and escape harm. Now, tilling the soil with fast-moving tractors does not allow amphibians to escape the blades and some injured or killed.

Chemical fertilizers and pesticides are being used extensively in Pakistan to boost agricultural production. These have adverse effects on local amphibians inhabiting crop fields. The sprayed poisons are readily absorbed through the skins of amphibians, thereby killing them. Khan (1990) recorded the dead adult amphibians from eight sprayed cotton fields: *Bufo stomaticus* 489, *Hoplobatrachus tigerina* 42, *Fejervarya limnocharis/syhadrensis* 15, and *Euphlyctis cyanophlyctis* 14. All tadpoles in nearby pools receiving washout from fields were dead.

Granaries harbour insects that are a food source attracting local amphibians. The granaries also provide darkness and shelter that make them favourable habitat for amphians and the frogs remain resident in them. Periodically, granaries are fumigated to remove insect pests, and amphibians seeking refuge there are also killed. Amphibian species recorded as killed by fumigations were *Bufo stomaticus. Hoplobatrachus tigerinus, Euphlyctis cyanophlyctis* and *Fejervarya limnocharis.*

### Urbanization

Throughout the Indus Valley large tracts of “bad land” were acquired to set up industries and associated housing. These areas once contained permanent wetlands providing sites for the breeding, development and feeding of amphibians and other wildlife. Villages and small towns in Punjab and elsewhere in Pakistan used to have ponds and puddles formed from excavations at building sites. These accumulated rainwater that provided breeding sites for local amphibians. With increased urbanization these habitats have largely been destroyed and housing schemes and plaza have appeared instead. The species most adversely affected by urbanization are *Bufo stomaticus*, *Microhyla ornata*, *Euphlyctis cyanophlyctis, Hoplobatrachus tigerinus,* and *Limnonectes limnocharis/syhadrensis.*

Construction of roads is an important element in urbanization schemes. During summer, the traffic on roads takes a heavy toll of local amphibians. Khan’s (1990; his Table 2) survey of amphibian roadkills on a road with normal traffic flow during two consecutive years indicates that almost all local species, except for *Microhyla ornata* and *Fejervarya* spp., were killed.

### Exploitation for Scientific Experimentation and Demonstration

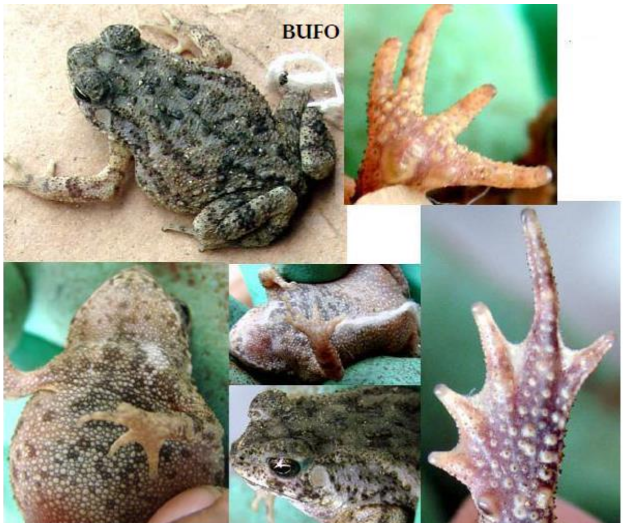
The larger species from the plains, such as *Hoplobatrachus tigerinus* and *Euphlyctis cyanophlyctis*, are extensively used in educational institutions throughout Pakistan for demonstration of vertebrate morphology and physiology. Use of amphibians for this purpose has resulted in depletion of natural populations from large areas in Punjab and Sindh to an alarming extent (Khan, 2006).

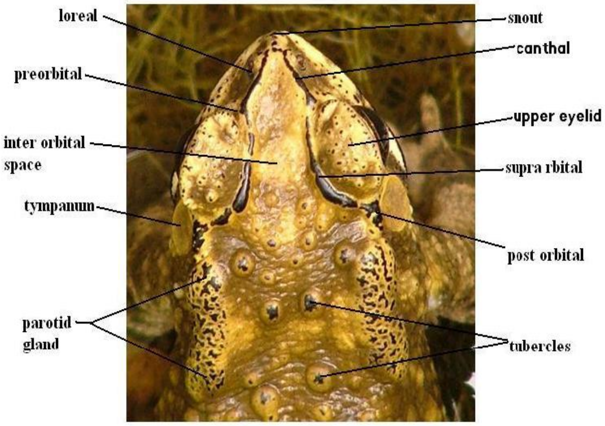
# Chapter 3

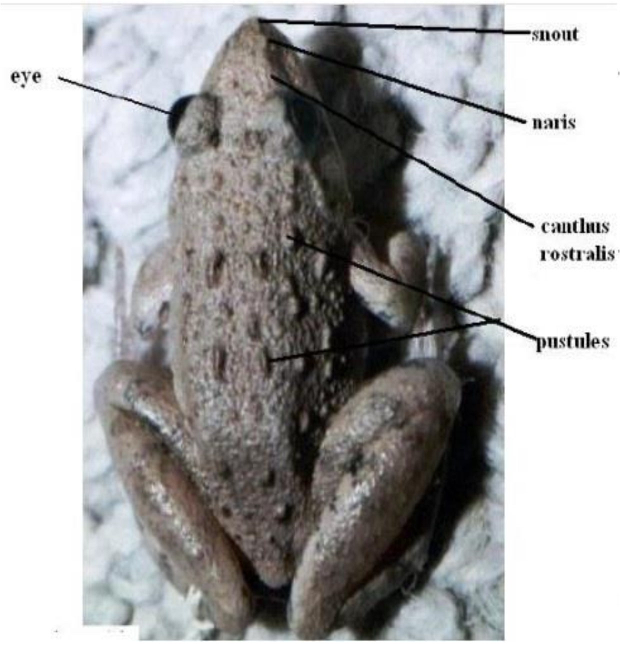
## Amphibia: Morphology & Description of Species

Morphology.................................................... 19
Key to Families............................................... 20
Family Bufonidae............................................ 20
Family Megophryidae..................................... 26
Family Microhylidae....................................... 26
Family Ranidae............................................... 28
Zoogeography Distribution............................. 36

### MORPHOLOGY

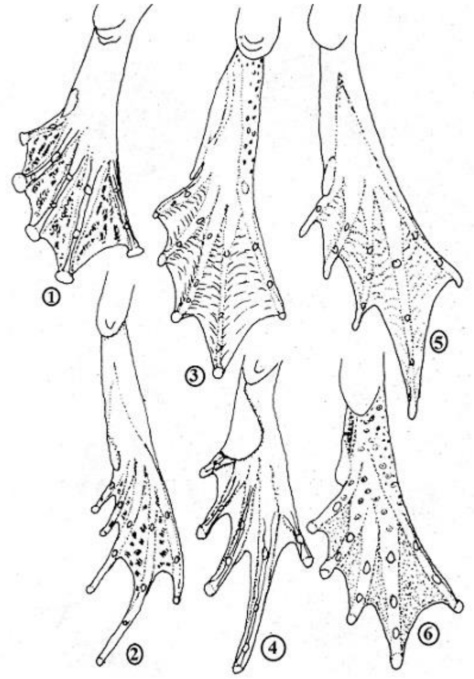






## KEY TO FAMILIES

1.a Parotid gland present.............. Bufonidae
b. Parotid gland not present ...................... 2
2. a. Tympanum indistinct; body with thick broken longitudinal folds with tubercles and spines .........Megophryidae
b. Tympanum mostly distinct; body with smooth folds profusely and tubercles ............................................... 3
3.a Pupil vertical ..................... Microhylidae
b. Pupil horizontal.......................... Ranidae



**1.** *A. hazarensis;* **2.** *F. limnocharis;* **3.** *E. cyanophlyctis;* **4.** *S. breviceps;* **5.** *H. tigerinus;* **6.** *C. sternosignata.*

## I. Family Bufonidae

**Key:**

1. Head with cranial crests ............................2
Head without cranial crests ........................3
2. Supraorbital crest only is present; tympanum indistinct.......................................... ..........................*Duttaphrynus himalayanus*
Supraorbital, canthal, postorbital, and orbitotympanic crests present, tympanum distinct ....................*Duttaphrynus hazarfensis*
3. Tympanum distinct ....................................4
Tympanum indistinct.....*Pseudepidalea surda*
4. Tibial gland absent .....................................5
Tibial gland present....................................6
5. Dorsum with green pattern.........................7
Dorsum uniformly olive.............................. ..............................*Duttaphrynus olivaceus*
6. Tarsal fold indicated by a weak spinulated line .......................*Duttaphrynus stomaticus*
Tarsal fold present....*Pseudepidalea latastii*
7. Dorsal pattern of scattered green spots ........

............................*Pseudepidalea zugmayeri*
Dorsal pattern of coalesced green blotches..........*Pseudepidalea pseudoraddei*

### 1. *Bufo olivaceus* Blanford
**(Fig.3.1)**

1. No cranial crest.
2. Tympanum very distinct.
3. First finger longer than the second.
5. Subarticular tubercles of toes single, no tarsal fold.
6. Parotoids depressed, elongated, reaching to sacral region.
7. Dorsum is smooth.
   Snout-vent length 52-65 mm.

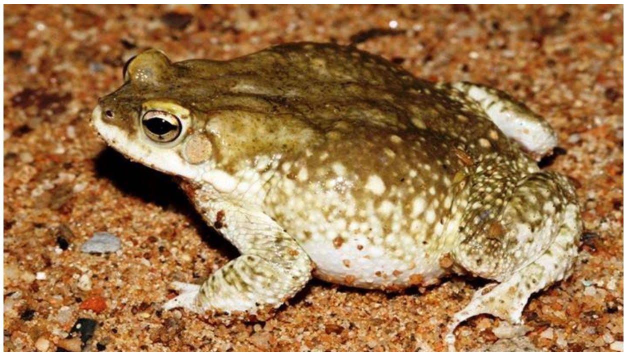


**Fig.3.1.** *Bufo olivaceus* Blanford.

*Colour:*
Uniformly greyish-olive dorsum, with darkish spotting on limbs; ventrum whitish.

*Habitat:*
Confined to the oases and pools of karez water (underground streams, typical for Balochistan). Nocturnal, often ventures into human habitations to feed on photophilic insects.

*Range:*
Recorded from the extreme western parts of Balochistan and adjoining Iran.

### 2. *Bufo stomaticus* Lütkin
**(Fig.3.2)**

1. No cranial crests.
2. Tympanum distinct, round, its diameter two thirds that of eye.
3. First and second fingers subequal.
4. Toes with single subarticular tubercles.
5. A tarsal spinulated ridge.
6. The parotoid gland is longer than broad.
7. A distinct tibial gland is present.
   Snout-vent length 67-70 mm.

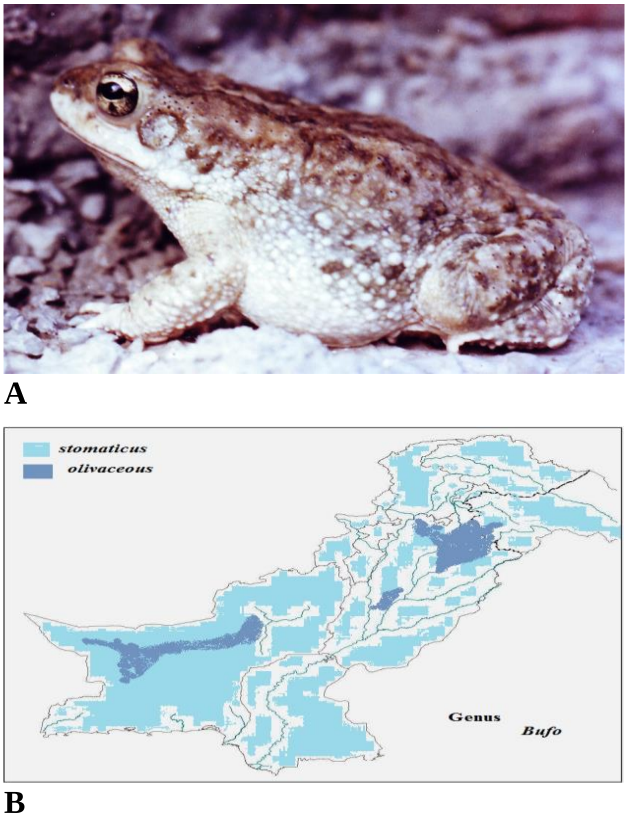


**Fig.3.2. A,** *Bufo stomaticus* Lütkin. B shows distribution of Genus *Bufo* in different parts of Pakistan.

*Colour:*
Dorsum light gray or olive to almost black, with dark mottling or gray to dark reticulation; upper lip cream. Ventrum dirty white, dark mottling on throat, 3 dark transverse bands on anterior aspect of forearm. Tips of digits dark brown.

*Habitat:*
The most common toad in the plains of Punjab and Sindh. It extends to an elevation over 2000 m in the northern and western hilly areas.

*Range:*
Widely distributed throughout the Indo-Pakistan subcontinent, from Bangladesh through the Ganges Plain, peninsular India, upper and lower Indus Valleys, Balochistan, Afghanistan, Iran, and Muscat. It does not extend beyond Mumbai along the west coast of southern India.

### 3. ***Duttaphrynus himalayanus*** Günther
**(Fig.3.33)**

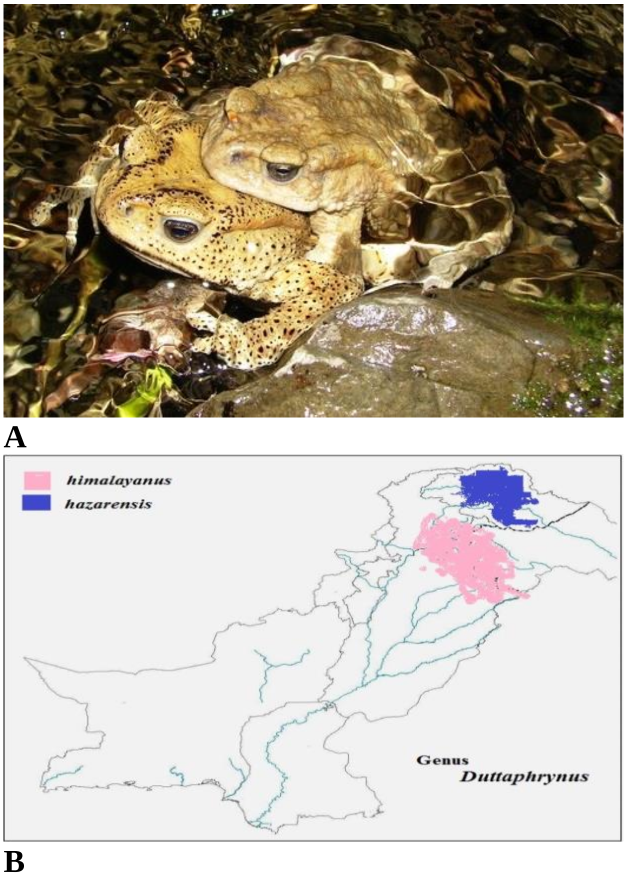


**Fig.3.3. A,** *Duttaphrynus himalayanus* Günther. B shows distribution of Genus *Duttaphrynus* in different part of Pakistan.

1. Supraorbital and canthal ridges, present.
2. Interorbital space broader than the upper eyelid.
3. Tympanum very small or indistinct.
4. First finger does not extend beyond second.
5. Toes with single subarticular tubercle, no tarsal fold.
6. Parotoid gland as long as head.
7. Body with irregular porous tubercles. Snout-vent length 130-132 mm.

*Colour:*
Uniformly brown. Cranial crest and tips of digits dark brown.

*Habitat:*
A mountain species.

*Range:*
From the Himalayas at 2000-3500 m of elevation. In Pakistan recorded from Azad Kashmir, Hazara Division, Khyber Pakhtunkhwa.

### 4. ***Pseudepidalea latastii*** Boulenger
**(Fig.3.4)**

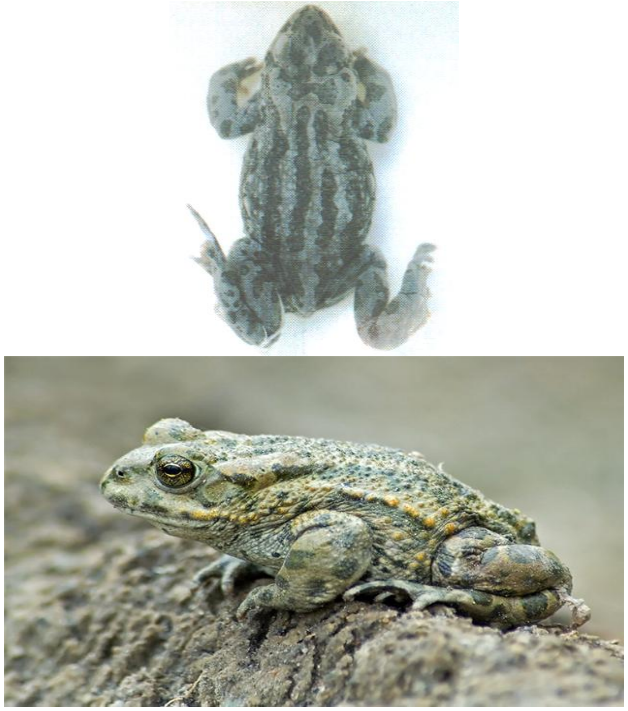


**Fig.3.4.** *Pseudepidalea latastii* Boulenger.

1. No bony ridges on head.
2. Interorbital space narrower than the upper eyelid.

3. Tympanum distinct, half the diameter of the eye.
4. Toes with double subarticular tubercles.
5. Parotoid kidney-shaped.
   Snout-vent length 50-62 mm.

*Colour:*
Dorsum olive, spotted or marbled with black; light and dark stripes on body dorsum. Ventrum more or less spotted and tips of digits black.

*Habitat:*
High-altitude toad is found in shallow pools of water along streams in valleys. Hides under stones, rocks, and vegetation.

*Range:*
Ladakh in Baltistan between 2600 and 3000 m of elevation.

*Taxonomic Note:*
Khan (1997) described this toad as Bufo siacheninsis (Pakistan J. Zool. 29(1):43-48), from Shinu village, on the left bank of the River Shyok, 140 km east of Skardu, at the foot of Siachen Glacier, Baltistan, northeastern Pakistan.

### 5. ***Duttahrynus hazarensis*** Khan
**(Fig.3.5)**

1. Head with bony ridges, temporal ridge present; rostral absent.
2. Parotoid glands kidney-shaped.
3. Double subarticular tubercles under penultimate phalanx of all fingers.
   One of Pakistan's largest toad, female exceeds 150 mm in snout-vent length.

*Colour:*
Dorsum uniformly gray of various shades, brown or reddish with dark spots, ventrum uniformly dirty white; speckled with light brown on chin and throat.
Throat of the breeding male is light orange or yellow. It develops cornified pads on inner side of first and second fingers.

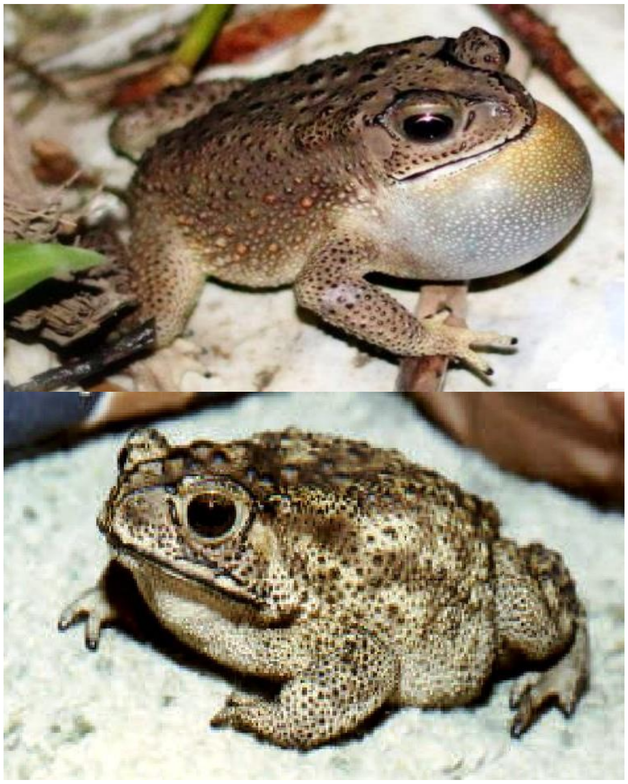


**Fig.3.5.** *Duttahrynus hazarensis* Khan.

*Habitat:*
A rare toad, mostly confined to the low northern hilly ranges and Azad Kashmir. Lethargic timid animal moves about with deliberate hops from place to place in search of insects.

*Range:*
Reported to be confined to District Hazara, Khyber Pakhtunkhwa, Alpine Punjab and Azad Kashmir.

### 6. ***Pseudepidalea pseudoraddei*** Mertens
**(Fig.3.6)**

No cranial crests. Recognized from *P. zugmayeri* by its heavy dorsal body color and typical pattern.

*Colour:*
The dorsum is dark green with a light vertebral stripe and lighter spots on flanks. Limbs are with large dark blotches. Dorsal tubercles are not so prominent, rather they are flat.

*Habitat:*
Inhabits rocky areas around Mingora, Swat. During the day, it hides under stones and retreats into fissures among rocks, swarming out at dusk.

*Range:*
From Mingora, high mountains of eastern Afghanistan.

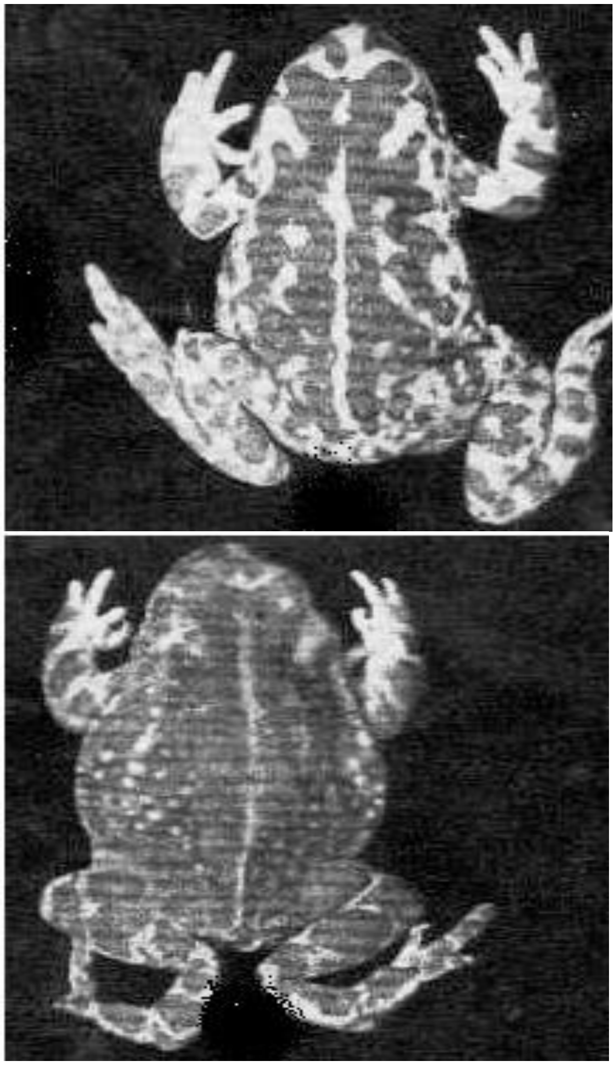


**Fig.3.6.** *Pseudepidalea pseudoraddei* Mertens.

### 7. *Pseudepidalea baturae* Stöck, Schmid, Steinlein, Grosse
**(Fig.3.7)**

1. No cranial crests.
2. Parotoids inconspicuous.
3. Interorbital space smaller or nearly equals the internarial space.
4. Subarticular tubercles single under toes; often double on first, second and, in some cases, third finger.
   Snout-vent length 60-65 mm.

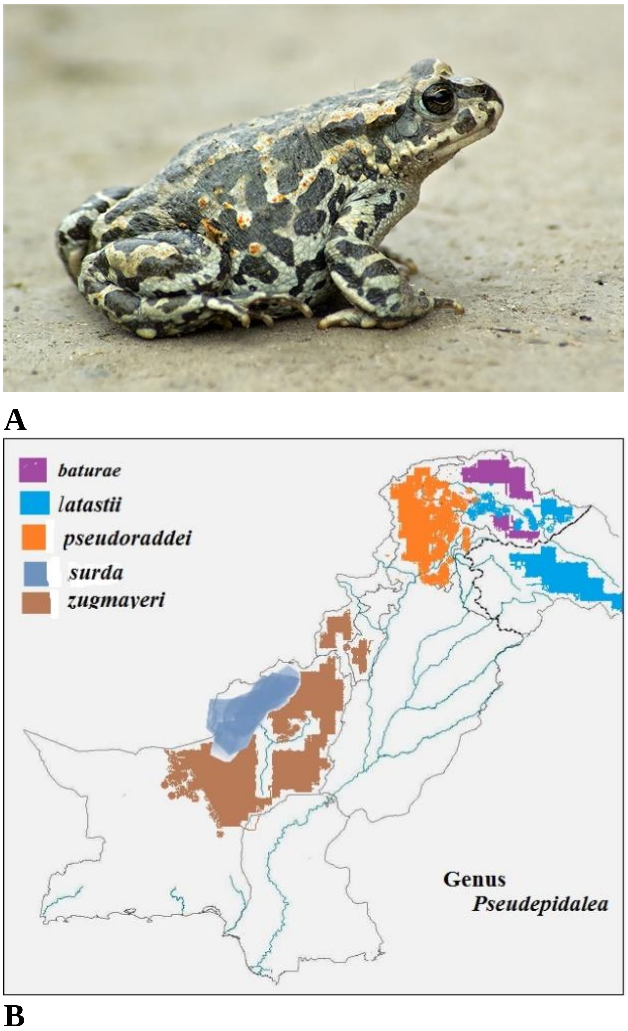


**Fig.3.7. A,** *Pseudepidalea baturae* Stöck, Schmid, Steinlein, Grosse. B shows distribution of Genus *Pseudepidalea* in different parts of Pakistan.

*Colour:*
Dorsum grayish green or grayish brown, with irregular dark green spots, mostly smaller or about the size of the eye. Spots partially

connected to form a marbled pattern with indented margins. In male brownish or grayish irregular spots at extremities.

*Habitat:*
A mountain species, it inhabits marginal vegetation along fast-flowing streams in the glacier-ridden northeastern Pakistan.

*Range:*
Swat, Passu, Swat, Karakoram Range, Gilgit Agency, Baltistan, Pakistan.

### 8. *Pseudepidalea surda* Boulenger
**(Fig.3.8)**

1. Head without cranial crests.
2. Interorbital space narrower than the upper eyelid.
3. Tympanum distinct, about half the diameter of the eye.
4. Fourth toe with single subarticular tubercles.
5. Parotoid squarish, as long as upper eyelid.
6. Dorsal tubercles unispinulate.
   Snout-vent length 45-65 mm.

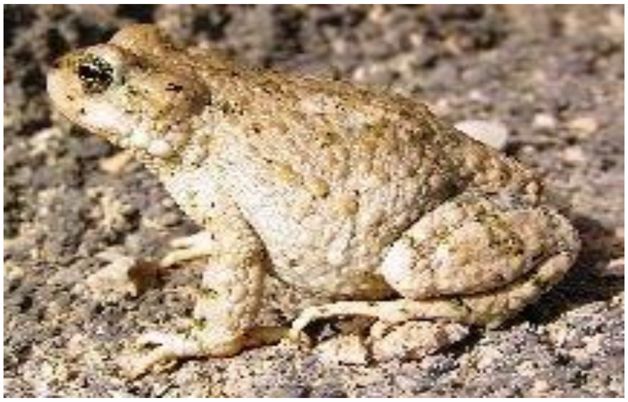


**Fig.3.8.** *Pseudepidalea surda* Boulenger.

*Colour:*
Dorsum gray, with greenish spotting; a dark blotch on the upper eyelid.

*Habitat:*
Nocturnal, spends day hiding under stones, vegetation, and falling logs, retreating into holes and crevices in the ground.

*Range:*
A little known species. Reported along western Balochistan and around Quetta, however, widely reported in adjacent Iran and Afghanistan.

### 9. *Pseudepidalea zugmayeri* Eiselt and Schmidtler
**(Fig.3.9)**

1. No cranial crests.
2. The post-tympanic part of the parotoids extends on side to lower tympanic fold.
3. The interorbital space wider than the upper eyelid.
4. First finger longer than second.
5. Double subarticular tubercles under fourth toe.
6. Smooth tarsal fold.
7. Body dorsum with numerous weak warts, which are arranged in double rows on flanks.
   Snout-vent length 50-70 mm.

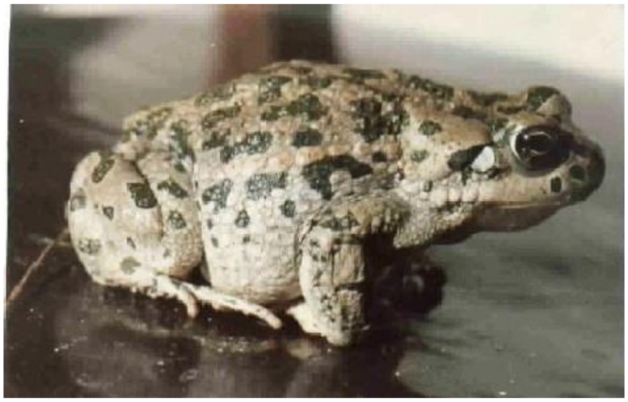


**Fig.3.9.** *Pseudepidalea zugmayeri* Eiselt and Schmidtler.

*Colour:*
Light brown, head and body with numerous small dark green spots, smaller than eye. Finger and toe tips light.

*Range:*
Mountain ranges around Quetta, extending southwest into Chagai, Balochistan.

## II. Family Megophryidae

### ***Scutiger nyingchiensis*** Fei
**(Fig.3.10)**

1. Dorsum with spiny tubercles and interrupted longitudinal short spiny folds.
2. Tympanum indistinct.
3. Snout round, scarcely projecting, canthus obtuse, loreal oblique and concave.
4. Fingers short and flattened, first as long as or a little shorter than second.
5. Toe tips obtuse, nearly entirely webbed, distal phalanx of the fourth toe free.

Snout-vent length 50-57 mm.

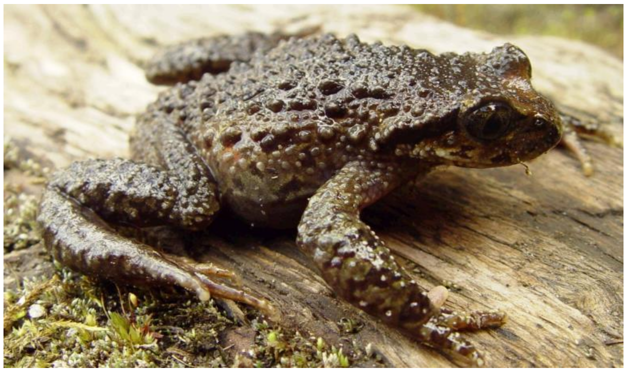


**Fig.3.10.** *Scutiger nyingchiensis.*

*Colour:*
Uniform dark olive dorsum or with numerous small dark spots. A light median stripe sometimes present. A black stripe from snout, naris, eye, and shoulder.

*Habitat:*
Himalayan torrenticole frog, between 3000 and 5000 m of elevation.

*Range:*
Ranges from Tibet to Kashmir.

## III. Family Microhylidae

**Key:**

1. Body frog-like, tongue elliptical; a dermal ridge between internal naris; adult does not exceed 30 mm in body length...............................genus *Microhyla*
   Body globular, tongue oval; a pair of tubercles between internal naris; adult size 50-60 mm.................. genus *Uperodon*

### 1. ***Microhyla ornata*** (Duméril and Bibron)
**(Fig.3.11)**

1. A small, slender-bodied, narrow mouth frog, snout-vent length hardly exceeds 30 mm.
2. Interorbital space broader than the upper eyelid.
3. Fingers slender, first much shorter than second.
4. Toes long with slight rudiment of web.
5. Subarticular tubercles distinct, tips of digits slightly swollen.
6. Dorsum smooth or slightly tuberculated.
8. No tarsal fold.

Snout-vent length 27-29 mm.

*Colour:*
Dorsum reddish olive, with an elongated dark brown mark along midback, extending from between eyes backward, narrowing on nape, widening above shoulders, narrowing then widening at back, sends a stripe to groin and another to thigh on each side. A dark streak from the eye to the shoulder, the limbs are barred. Ventrum white, throat and chest dark brown in breeding male.

*Habitat:*
A small active frog, hides under stones, logs, and heaps of vegetation, and in fissures and holes in ground, along the sides of streams and ponds.

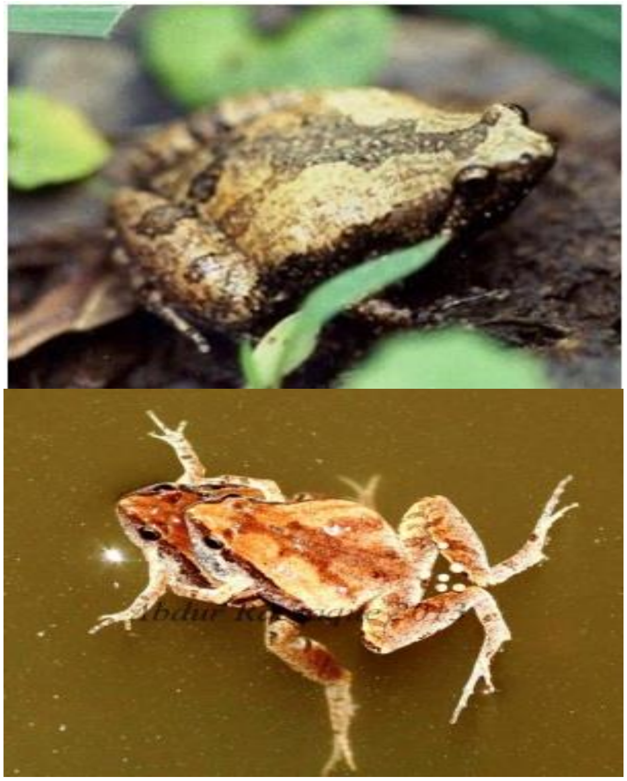


**Fig.3.11.** *Microhyla ornata* (Duméril and Bibron).

*Range:*
A wide-ranging Southeast Asian species, extends from the Malay Peninsula, Siam, southern China, Cambodia, Myanmar, Nepal, Kashmir, Sri Lanka, and throughout India; recently shown to have wide Range in Punjab, Pakistan

### *2. Uperodon systoma* (Schneider)
**(Fig.3.12)**

1. Rotund, stout body, puffed round ball-like.
2. Snout scarcely longer than diameter of the orbit.
3. No canthus, snout round.
4. Fingers moderate, first a little shorter than second.
5. Toes short webbed at the base.
6. A pair of strong shovel-shaped metatarsal tubercles, inner larger.
7. Dorsum smoothly tubercular, supratympanic fold present, throat and chest smooth, belly and cloacal region granular.
   Snout-vent length 50-60 mm.

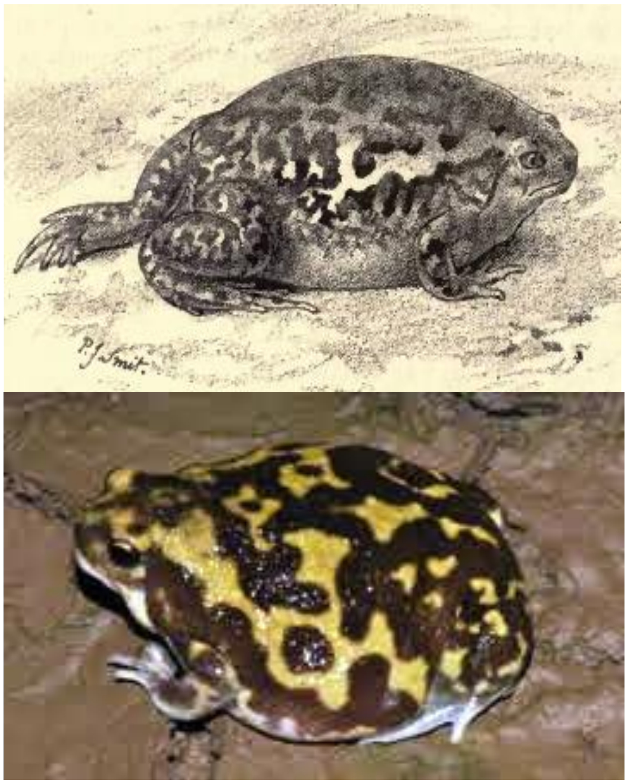


**Fig.3.12.** *Uperodon systoma* (Schneider).

*Colour:*
Body dorsum with more or less symmetrical dark brown pattern on a pinkish brown background. Ventrum whitish immaculate.

*Habitat:*
Completely fossorial species, it surfaces during summer monsoons. moves by small hops or slowly walks; is a weak swimmer, floats in water, It is an excellent burrower, quickly burrowing into the loose moist soil with the help of its well-developed and powerful metatarsal tubercles.

*Range:*

A very rare frog in Pakistan, recently a specimen was collected from the foot of Shakarparian Hills, Islamabad, from the side of a stream during a wet May night. This species is widely distributed in southern and eastern India, extending into northern Sri Lanka.

## IV. Family Ranidae

**Key:**

1. Tympanum indistinct........ *Nanorana vicina*
   Tympanum distinct.................................... 2
2. Toes half webbed....................................... 3
   Toes extensively webbed............................ 5
3. Habitus toad-like, inner metatarsal tubercle shovel- shaped ....... *Sphaerotheca breviceps*
   Habitus frog-like, inner metatarsal tubercle elongate....................................................... 4
4. First finger hardly extending beyond second; tibiotarsal joint reaching to anterior border of eye or a point between eye and tip of snout .................. *Fejervarya syhadrensis*
   First finger longer than second; tibiotarsal joint reaching tympanum or naris ............................... *Fejervarya limnocharis*
5. Body dorsum pustulate .............................. 6
   Body dorsum with longitudinal folds ............................ *Hoplobatrachus tigerinus*
6. Nuptial spines on at least first 2 fingers..... 7
   Nuptial spines absent .................................. ............................. *Euphlyctis cyanophlyctis*
7. Pustules large, multispinulate; belly spiny ............................. *Chrysopaa sternosignata*
   Pustules small, unispinulate; belly spineless. 8
8. Spinules on longitudinal ridges Spinules on pustules ......................... *Allopaa hazarensis*

### 1. *Euphlyctis cyanophlyctis cyanophlyctis*
(Schneider)
**(Fig.3.13)**

1. The interorbital space is narrower than the upper eyelid.

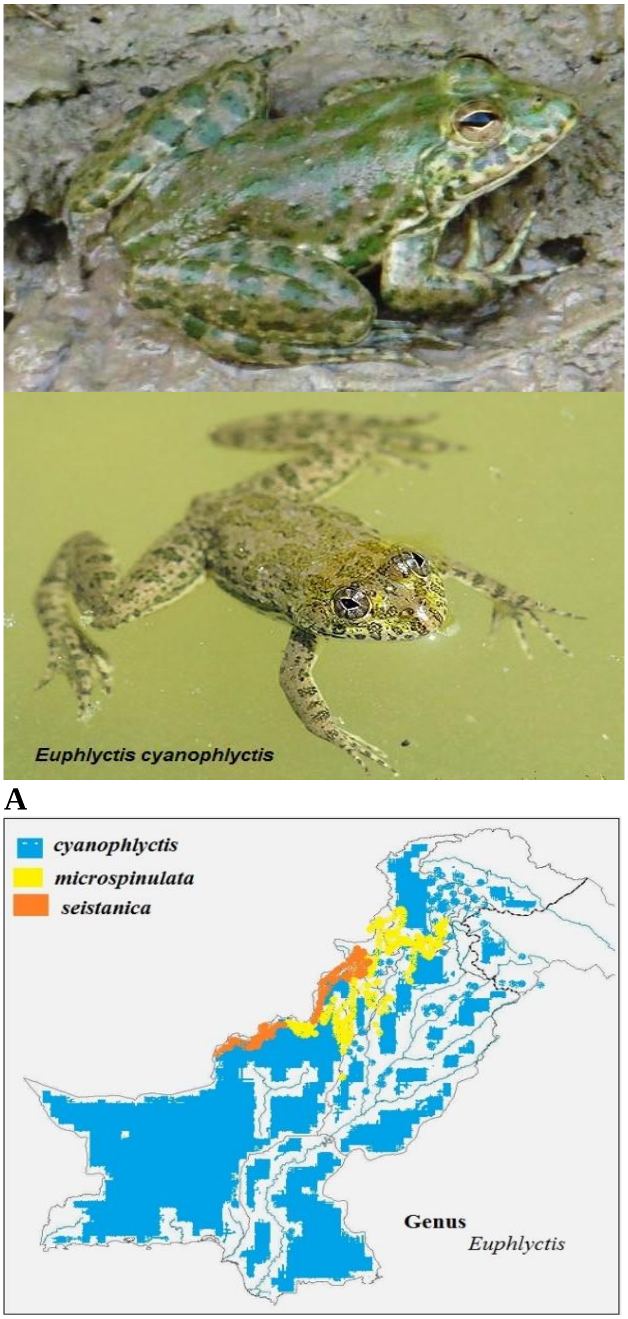


**Fig.3.13. A,** *Euphlyctis cyanophlyctis cyanophlyctis* (Schneider). B shows distribution of Genus *Euphlyctis* in different parts of Pakistan.

2. Tympanum is distinct, about two thirds the size of the eye.
3. Fingers slender, pointed or slightly swollen

at the tips, first not extending beyond second.

4. Toes are completely webbed.
5. Inner metatarsal tubercle long, conical much like a rudimentary toe.
6. Male with vocal slits under the lower jaw.
7. Dorsum with numerous scattered small smooth tubercles, sides of body rugose, ventrum smooth. Male (43-46 mm) is smaller than female (55-67 mm) in snout-vent length.

*Colour:*
Dorsum light gray, olive-green or light brown, sometimes black, with irregular black spots. Thighs posteriorly dark with one or two yellow or white irregular longitudinal stripes; ventrum white, immaculate or with dark speckling or reticulation; vocal sacs light brown.

*Habitat:*
Highly aquatic and littoral frog. It remains permanently resident in different types of habitats with pooled water, in the plains and sub mountainous parts of Pakistan. The frog is remarkably capable of adjusting itself to the uncertain aquatic conditions in temperate arid parts of Pakistan. Its peculiar unique habit of skittering over the water surface is reported by the Mogul Emperor Babar in his autobiography.

*Range:*
Most widely distributed Oriental frogs. It extends from Thailand to Nepal, throughout India, Sri Lanka, almost throughout Pakistan, Iran and Afghanistan.

**Subspecies:**

***Euphlyctis c. seistanica*** (Nikolsky)

The snout is longer than length of the orbit.

*Range:*
Seistan, along the Pakistan-Afghanistan-Iran border (Khan 1997c).

***Euphlyctis c. microspinulata*** Khan

Fingers and toes with minute spinules.

*Range:*
Widely distributed in Balochistan, Afghanistan. Specimens have been collected from Waziristan and the Mianwali region, and around Jhelum city in Punjab, Pakistan.

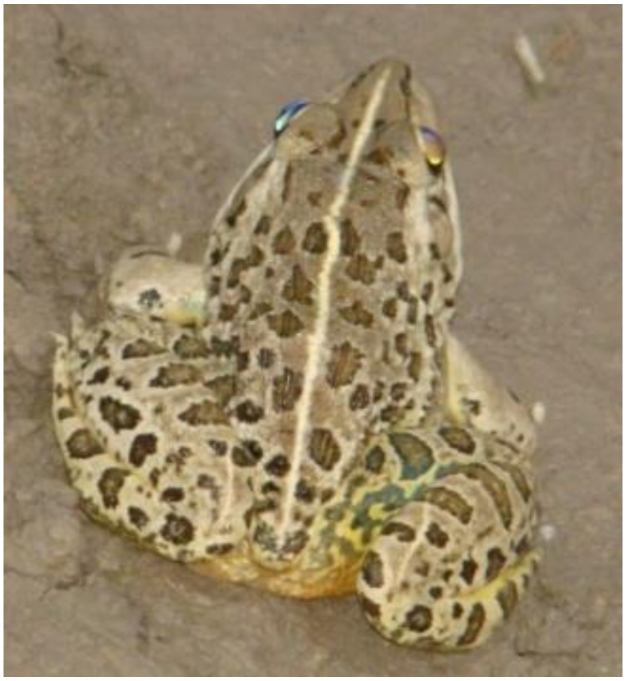
### ***2. Hoplobatrachus tigerinus*** (Daudin)

**(Fig.3.14)**

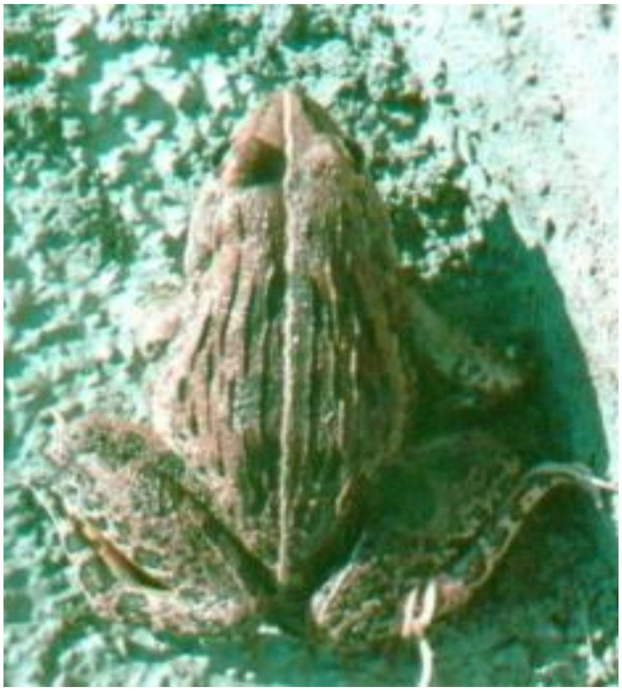
1. The head is slightly longer than wide; in older specimens it is wider.
2. Interorbital space much narrower than the upper eyelid.
3. Tympanum distinct, almost as large as the eye.
4. Fingers obtusely pointed, first longer than second.
5. Tibiotarsal articulation reaches eye or between eye and the naris.
6. Toes obtuse, with slightly swollen tips, entirely webbed, feebly emarginate.
7. Dorsum smooth or granular, with 6-14 longitudinal broken folds, occasionally interspersed with smooth tubercles, ventrum smooth.
8. Forelimbs of breeding male are thick, first finger is swollen, with grayish brown velvety horny layer at its base, blue vocal sacs are located on sides of the throat.
   Snout-vent length 130-145 mm.

*Colour:*
Dorsum olive green, olive or gray, with dark blotches, a light yellow vertebral streak, rarely absent; a dark canthal and a lighter labial streak often present; limbs with dark bars, which may break into dark blotches; thighs posteriorly

marbled with black and yellow; a fine yellow line along upper surface of thigh, another on the inner side of calf. Ventrum white, sometimes feeble pigmentation on throat.



**A**



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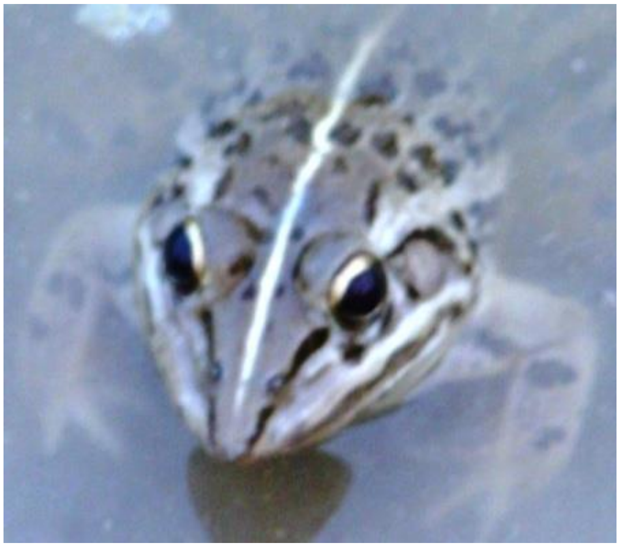

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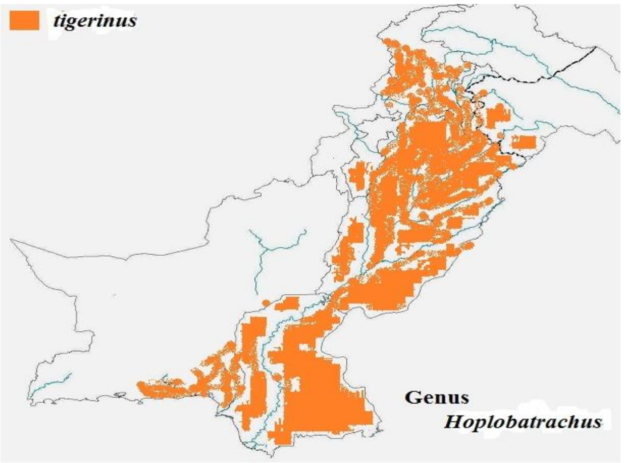


**D**

**Fig.3.14.** *Hoplobatrachus tigerinus* (Daudin) (A,BC). D shows its distribution in different parts of Pakistan.

*Habitat:*

Largest frog in the Pakistani plains. It hibernates by burrowing in soil during winter as well as during drought.

The frog does not stay in water for a long time; it spends most of its time hiding and feeding in surrounding vegetation. On approach of danger, it plunges into deep water, stays underwater for 2-3 minutes, then returns quietly to the marginal vegetation undetected. In clear pools of water it hides under bottom gravel.

*Range:* Most common frog in the Indo-Gangetic plains, mostly frequents cultivated areas and swampy wastelands. It does not extend into Balochistan, reported from Afghanistan close to the Khyber Pass.

### ***3. Fejervarya limnocharis*** (Boie)

**(Fig.3.15)**

1. Snout pointed, projecting beyond mouth.
2. Internarial space is longer than interorbital width, which is much less than width of the upper eyelid.
3. Tympanum distinct, half to two-thirds the diameter of eye.
4. Fingers obtusely pointed, first longer than second, subarticular tubercles very prominent.
5. Tibiotarsal articulation reaches tympanum or naris.
6. Toes obtuse or with slightly swollen tips, half webbed, subarticular tubercles small and prominent.
7. Male with loose gular region, with brown or blackish W-shaped mark, forelimbs stronger, with pad-like subdigital tubercles under first finger.
   Snout-vent length 39-43 mm.

*Colour:*
Gray brown or olive above, sometimes suffused with bright carmine; a V-shaped dark mark between eyes, a yellow vertebral stripe mostly present; lips and limbs barred, a light line along calf, thighs laterally yellow, marbled with black, ventrum white, throat is mottled with brown in male.

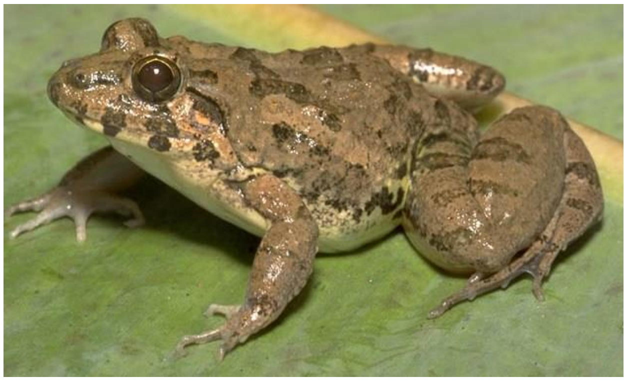


**Fig.3.15.** *Fejervarya limnocharis* (Boie).

*Habitat:*
Most common and widely distributed species, frequents marginal vegetation along canals, streams, fast-flowing streams, ponds, and puddles; when disturbed it leaps into the water, swimming back at once.

*Range:*
Sub-Himalayan parts of Pakistan, descending into the waters of Potwar Tableland to most of the Punjab plains and some of the lower Indus Valley where it is scarcer. It ranges from Japan to Pakistan.

### ***4. Fejervarya syhadrensis*** (Annandale)

**(Fig.3.16)**

1. First finger hardly extends beyond second.
2. Tibiotarsal articulation reaches anterior border of eye or a point between it and the tip of snout.
   Snout-vent length 32-34 mm.

*Colour:*
Grayish dorsum, with dark spots, sometimes with reddish and orange suffusion, a light narrow middorsal line is often present. Ventrum white. In breeding male gular region is black.

*Habitat:*
Abounds in paddy fields, marginal vegetation of ponds, puddles, and streams in plains. It becomes rarer in northern hilly tracts along sub-Himalayan ranges. Its call is typical, like the clatter of a typewriter, a loud "Trr, trr, trr, trr, trr", repeated several times.

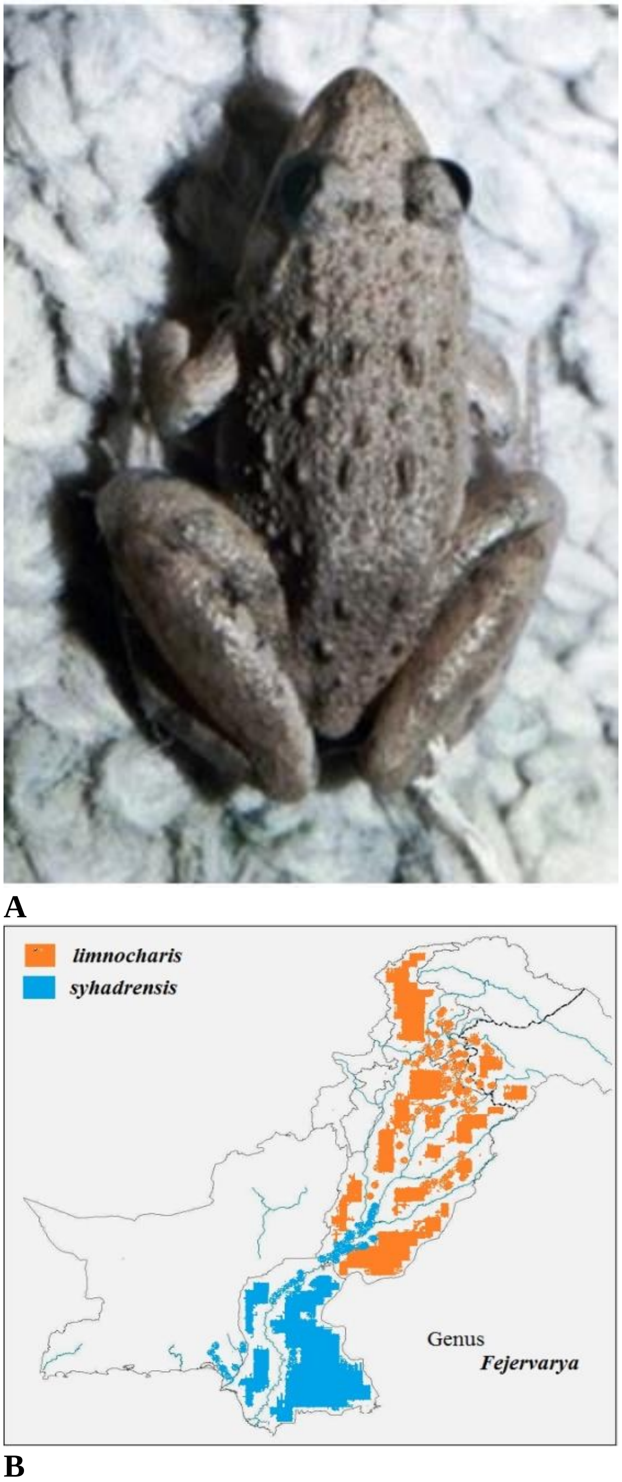


**Fig.3.16.** *Fejervarya syhadrensis* (Annandale). B shows distribution of species of genus *Fejervarya* in different parts of Pakistan.

*Range:*
Occurs sympatric in most of its range in Pakistan with Fejervarya limnocharis, which becomes rarer in the lower Indus Valley. Fejervarya syhadrensis is widely distributed throughout southern India.

### 5. *Allopaa barmoachensis* (Khan and Tasnim)
**(Fig.3.17)**

1. Head is wider than long.
2. Naris is below canthus, distance between naris greater than the width of the upper eyelid.
3. First finger longer than second.
4. Tips of digits swollen, with distinct large subarticular tubercles. A distinct groove between penultimate and last phalanx.
5. Body dorsum with dark unispinulate small tubercles.
6. Interorbital region tuberculated.
7. Male with nuptial spines on first finger and inner metacarpal tubercle.
8. Tympanum distinct.
   Snout-vent length 56-61 mm.

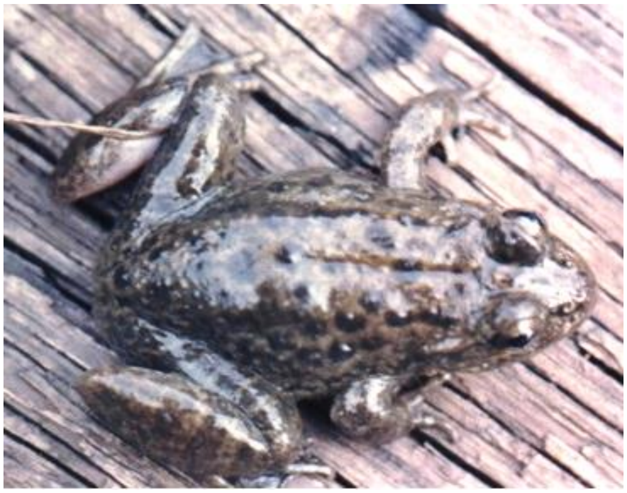


**Fig.3.17.** *Allopaa barmoachensis* (Khan and Tasnim).

*Colour:*
Dorsum gray olive in life with scattered dark

spots more numerous on flanks than in middorsum, a distinct pair of dark spots between eyes; dark mottling on forehead, jaws, supratympanic fold, canthus dark; fore- and hind limbs with crossbars breaking into a network of small brownish spots on hind of thighs. Ventrum dirty white, with light suffusion under hand and foot; throat and gular region mottled with gray; web between fingers olive gray.

*Habitat:*
Torrenticol frog.

*Range:*
Collected from Aram Bari, Tatta Pani, Charnali, and Kotli, all in District Kotli, Azad Kashmir.

### 6. ***Allopaa hazarensis*** (Dubois and Khan)
**(Fig.3.18)**

1. Head longer than wide.
2. Dorsal tubercles on short longitudinal folds.
3. Naris above the canthus.
4. Fewer or no tubercles in the interorbital region.
5. Forelimbs enlarged in breeding males, with nuptial spines on inner finger and metacarpal tubercle.
   Snout-vent length 55-62 mm.

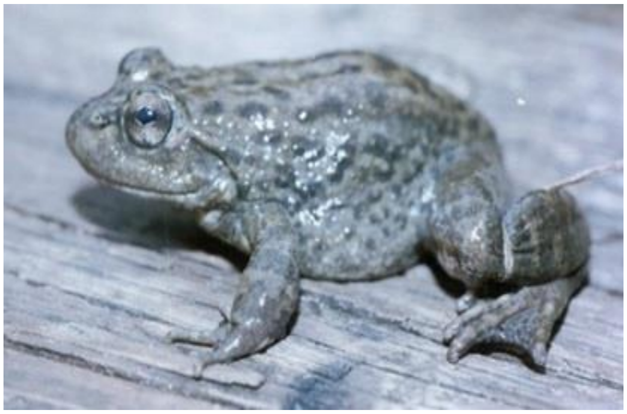


**Fig.3.18.** *Allopaa hazarensis* (Dubois and Khan).

*Colour:*
Body dorsum greyish superimposed with a network of darker color (dark olive green in life). A clear grey transverse band on the back of the head joining the posterior borders of the eyelids. Later edge of sypratympanic fold and canthus dark. Upper parts of the hind limbs with dark cross bars; hinder parts of thighs with a network of small blackish spots. Lower parts of the body and limbs whitish; throat mottled with grey. Webbing of feet greyish.

*Habitat:*
Frequents quieter and clear water pools in the bed of fast-flowing streams.

*Range:*
Known from fast-flowing streams in the Rush Valley in Hazara Division, Khyber Pakhtunkhwa, Pakistan.

### 7. ***Chrysopaa sternosignata*** (Murray)
**(Fig.3.19)**

1. Head much broader than long, much depressed, scarcely projecting.
2. Internarial distance greater than interorbital space, which is less than the width of the upper eyelid.
3. Tympanum not very distinct, about half the diameter of the eye.
4. Tibiotarsal articulation reaches the temple or posterior border of the eye.
5. Digits obtuse or slightly swollen at tips, toes entirely webbed, subarticular tubercles small.
6. Skin on body very loose; when the frog is on land, it is thrown in folds. Dorsum is smooth or tuberculated; tubercles are tipped with dark spines.
7. Sexually dimorphic: flanks of body of male are heavily tuberculated. Dark nuptial spines are on the first 2 fingers and the inner carpal tubercle. There is a large patch of pustules on both ventral sides of the

chest. Venter in male is tuberculated, that of female is smooth. The anterior limbs of the breeding male are considerably thickened.

Snout-vent length 88-90 mm.

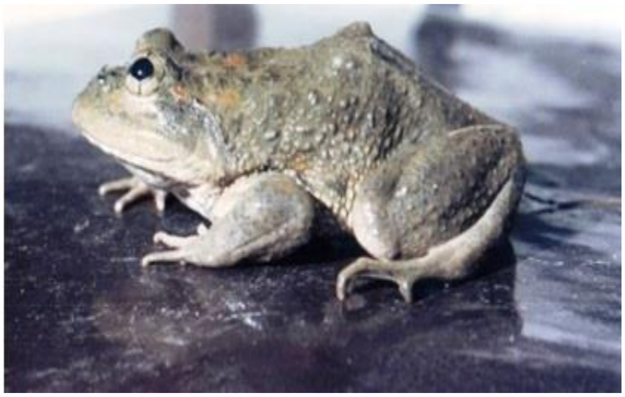


**Fig.3.19.** *Chrysopaa sternosignata* (Murray).

*Colour:*

Olive brown or dark green above, with small irregular yellow, orange, or reddish spots; ventrum white with profuse fine dark brown or black mottling. Young dark brown or olive, with blackish blotches. Pupil reduced to a narrow slit. A transverse dark streak runs across the eye, a similar vertical streak runs downward across the golden brown iris, giving the eye a peculiar appearance. This feature is also present in tadpole.

*Habitat:*

Thoroughly aquatic species, inhabiting clear pools with flowing karez water. When disturbed it jumps into the depths of the water and hides under gravel at the bottom or under dense marginal vegetation and thick floating algal cover. Never leaves water; even in freezing winter, remains sluggishly active beneath in the unfrozen water.

*Range:*

Abounds around Quetta and Mastung in karez channels, also reported from Afghanistan.

### *8. Nanorana vicina* (Stoliczka)
**(Fig.3.20)**

1. Naris a little nearer to the eye.
2. Tympanum indistinct.
3. First finger as long as second.
4. Toes half webbed.
5. Outer metatarsal tubercle reduced, inner narrow, feebly developed.
6. Body dorsum tuberculate, no spines.

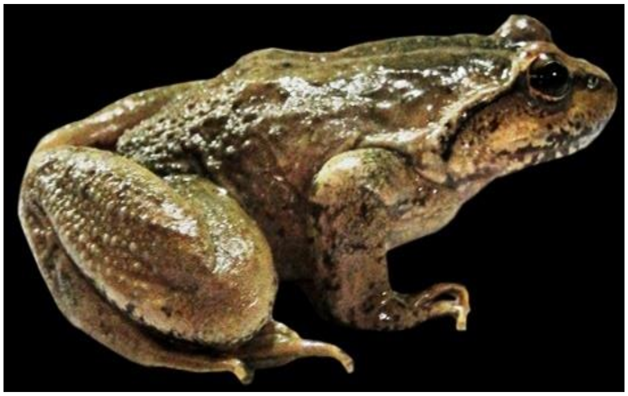


**Fig.3.20.** *Nanorana vicina* (Stoliczka).

*Colour:*

Body dorsum and limbs uniform light-olive. An indistinct sooty interrupted stripe from snout to the angle of jaws. Black mottling on lips, tympanic region, chest and posterior sides of the limbs, with indistinct dark bars on thigh and shank. Yellowish white ventrum with dusky chin and black mottling on chin and undersides of the limbs.

*Range:*

Known from Alpine Pakistan, ranges to Azad Kashmir.

### *9. Sphaerotheca breviceps* (Schneider)
**(Fig.3.21)**

1. Habitus short, stocky, toad-like.

2. Head broader than long, top flat.
3. First finger longer than second, tips swollen.
4. Hind limbs short, tibiotarsal articulation reaching the axilla.
5. Toes half to one fourth webbed. Inner metatarsal tubercle long, compressed, flat, shovel-shaped.
6. Skin smooth, slightly varicose, with feeble longitudinal dorsal folds.
7. Tympanum distinct, as large as eye.
   Snout-vent length 49-52 mm.

*Colour:*
Dorsum olive golden, with a light yellow median line; a well marked large golden ocellus on shoulder on each side, continuing obliquely along flanks. Indistinct yellowish bars on limbs and jaws. Sometimes dorsum is faintly mottled. Ventrum cream, gular region black in breeding male.

*Habitat:*
Inhabits relatively humid parts of Pakistan and is found in abundance along the Himalayan foothills in the northwest. It is essentially nocturnal, emerging at dusk from of its burrow which it excavates in soft sandy soil with the help of its broad shovel-shaped inner metatarsal tubercle.

*Range:* Widely ranges throughout India, Bangladesh, Nepal, Myanmar, and Sri Lanka. In Pakistan it is reported from the Himalayan foothills, and extends into the Potwar Tableland. It has spotty Range in the riparian system of Punjab, colonies are reported in desolate parts of the Cholistan Desert. Collected from the Hab and Malir River Valleys, around Karachi.

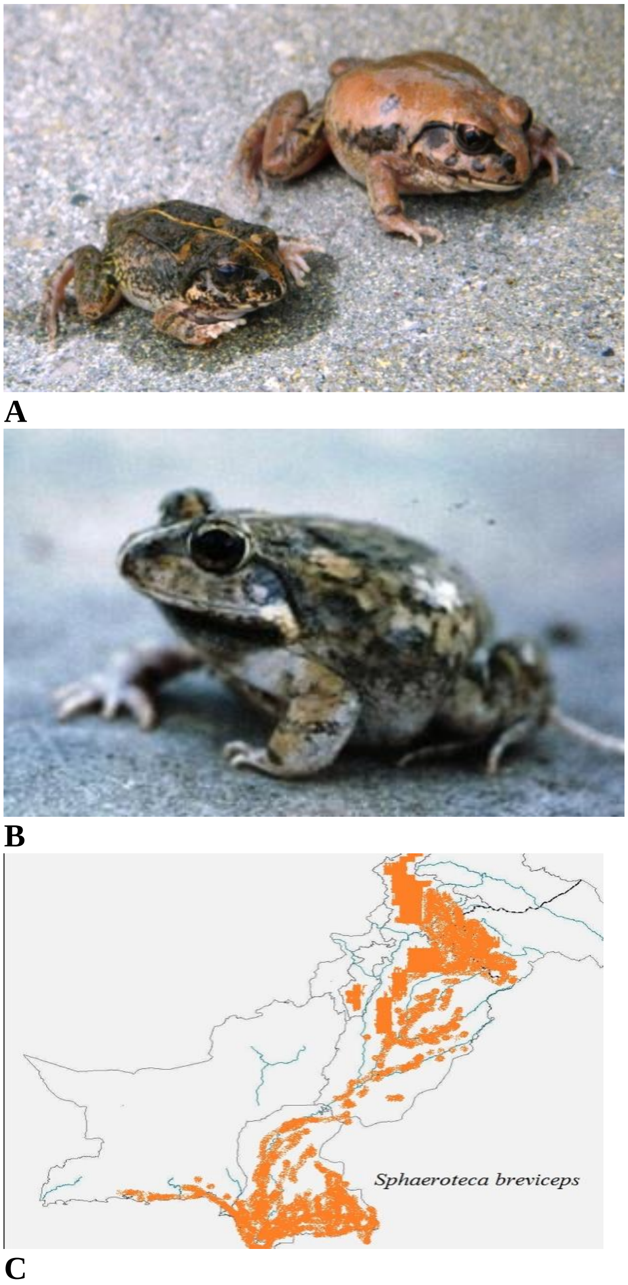
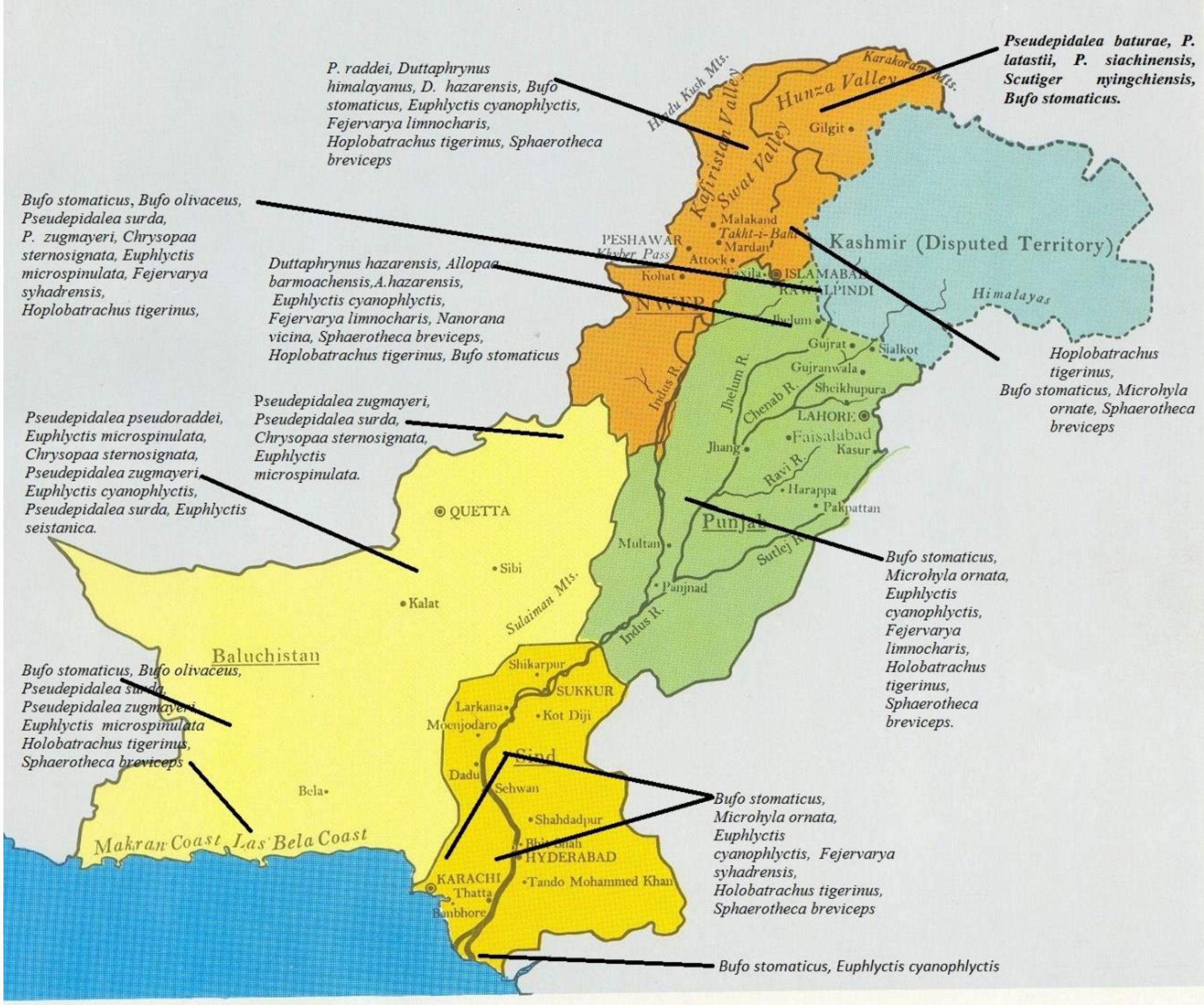


**Fig.3.21.** *Sphaerotheca breviceps* (Schneider). C shows its distribution in different parts of Pakistan.

# ZOOGEOGRAPHY



*P. raddei, Duttaphrynus himalayanus, D. hazarensis, Bufo stomaticus, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Hoplobatrachus tigerinus, Sphaerotheca breviceps*

***Pseudepidalea baturae, P. latastii, P. siachinensis, Scutiger nyingchiensis, Bufo stomaticus.***

*Bufo stomaticus, Bufo olivaceus, Pseudepidalea surda, P. zugmayeri, Chrysopaa sternosignata, Euphlyctis microspinulata, Fejervarya syhadrensis, Hoplobatrachus tigerinus,*

*Duttaphrynus hazarensis, Allopaa barmoachensis, A. hazarensis, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Nanorana vicina, Sphaerotheca breviceps, Hoplobatrachus tigerinus, Bufo stomaticus*

*Hoplobatrachus tigerinus, Bufo stomaticus, Microhyla ornate, Sphaerotheca breviceps*

*Pseudepidalea zugmayeri, Pseudepidalea surda, Chrysopaa sternosignata, Euphlyctis microspinulata.*

*Pseudepidalea pseudoraddei, Euphlyctis microspinulata, Chrysopaa sternosignata, Pseudepidalea zugmayeri, Euphlyctis cyanophlyctis, Pseudepidalea surda, Euphlyctis seistanica.*

*Bufo stomaticus, Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya limnocharis, Holobatrachus tigerinus, Sphaerotheca breviceps.*

*Bufo stomaticus, Bufo olivaceus, Pseudepidalea surda, Pseudepidalea zugmayeri, Euphlyctis microspinulata Holobatrachus tigerinus, Sphaerotheca breviceps*

*Bufo stomaticus, Microhyla ornata, Euphlyctis cyanophlyctis, Fejervarya syhadrensis, Holobatrachus tigerinus, Sphaerotheca breviceps*

*Bufo stomaticus, Euphlyctis cyanophlyctis*

**Fig.3.22.** Geographical distribution of frogs and toads of Pakistan

## APPENDIX

| Scientific names | Common English | Roman Urdu | Urdu |
|---|---|---|---|
| Toads & Frogs | Toads and Frogs | Maindak | مینڈک |
| **Family Bufonidae** | Toads | Gauk | غوک |
| *Bufo olivaceus* Blanford, 1874 | Olive Toad | Zatooni Gauk | غوک زیتونی |
| *Bufo stomaticus* Lütkin, 1862 | Indus Toad | Indus Gauk | غوک سندھی |
| *Duttaphrynus himalayanus* Günther, 1864 | Himalayan Toad | Himalayai Gauk | غوک ہمالیائی |
| *Duttaphrynus hazarensis* M. S. Khan, 2000 | Hazara Toad | Hazara Gauk | غوک ہزارہ |
| *Pseudepidalea latastii* , 1882 | Ladakh Toad | Ladakhi Gauk | غوک لدّاخی |
| *Pseudepidalea pseudoraddei baturae* Stöck, Schmid, Steinlein, & Grosse, 1999 | Batura Toad | Batura Gauk | غوک بتورا |
| *Pseudepidalea p. pseudoraddei* Mertens, 1971 | Swat Toad | Swati Gauk | غوک سواتی |
| *Pseudepidalea siacheninsis* M. S. Khan, 1997 | Siachine Toad | Siachin Gauk | غوک چین سیا |
| *Pseudepidalea surdus* Boulenger, 1891 | Iranian Toad | Irani Gauk | غوک ایرانی |
| *Pseudepidalea zugmayeri* Eiselt & Schmidtler, 1973 | Baloch Toad | Blooch Gauk | غوک چی بلو |
| **Family Megophryidae** | Tibti Frogs | Tibti maindak | مینڈک تبتی |
| *Scutiger nyingchiensis* Fei, 1977 | Tibetan Frog | Tibbiti Maindak | |
| **Family Microhylidae** | Narrow Mouth Frogs | Tang dahan Maindak | مینڈک دھان تنگ |
| *Microhyla ornata* (Duméril & Bibron, 1841) | Ant Frog: | Poodna Maindak | مینڈک پودنہ |
| *Uperodon systoma* (Schneider, 1799) | Marble Frog | Marmareen Maindak | مینڈک مرین مر |
| **Family Ranidae** | Frogs | Maindak | مینڈک دھان فراخ |
| *Euphlyctis cyanophlyctis cyanophlyctis* (Schneider, 1799) | Skittring Frog | Tapakta Maindak | مینڈک ٹپکتا |
| *Euphlyctis c. microspinulata* M. S. Khan, 1997 | Spiny Skittring Frog | Khardar Tapakta Maindak | مینڈک ٹپکتا دار خار |
| *Euphlyctis cyanophlyctis seistanica* (Nikolski, 1900) | Seistan Skittering Frog | Seistani Tapakta Maindak | مینڈک ٹپکتا سیستانی |
| *Hoplobatrachus tigerinus* (Daudin, 1802) | Bull Frog | Basanti Maindak | مینڈک بسنتی |
| *Fejervarya limnocharis* (Boie, 1834) | Alpine Cricket Frog | Uttri Tidda Maindak | مینڈک ٹڈا شمالی |
| *Fejervarya syhadrensis* (Annandale, 1919) | Southern Cricket Frog | Dakhni Tidda Maindak | مینڈک ٹڈا سندھی |
| *Allopaa barmoachensis* (M. S. Khan &Tasnim, 1989) | Kashmir Frog | Kashmir Nadi Maindak | مینڈک ندی کشمیر |
| *Allopaa hazarensis* Dubois & Khan, M. S. 1979 | Hazara Frog | Hazara Nadi Maindak | مینڈک ہزارہ |
| *Chrysopaa sternosignata* (Murray, 1885) | Balochistan karaiz Maindak | Bloochistani Karaiz Maindak | منیڈک کاریز چستانی بلو |
| *Nanorana vicina* (Stoliczka, 1872) | Murree Frog | Marri Nadi Maindak | مینڈک ندی مری |
| *Sphaeroteca breviceps* (Schneider, 1799) | Digging frog | Khodela maindak | مینڈک یلا د کھو |

# PART-II

## TURTLES & CROCODILES

*Gavialis gangeticus*

# Chapter 4

## Chelonia & Crocodilia

Family Emydidae ........................................... 41
Family Trionychidae ...................................... 44
Family Testudinidae........................................ 47
Family Crocodylidae....................................... 48
Family Gavialidae .......................................... 49

### Key to Families

1. Shell covered with epidermal plates ..........2
   No epidermal plates on shell ......................4
2. Limbs oar-shaped, with 1-3 claws ............... ................................................ Cheloniidae
   Limbs not oar-shaped, forelimb with 4-5 claws.........................................................3
3. Digits with vestiges of web; posterior limbs more elongated, plantar surface longer than broad................................... Emydidae
   Digits without web; feet stump-shaped,....... planter surface as broad as long .................. ................................................Testudinidae
4. Limbs with distinct digits, 3 claws present .. ............................................... Trionychidae
   Limbs without external evidence of digits, oar-shaped, clawless.......... Dermochelyidae

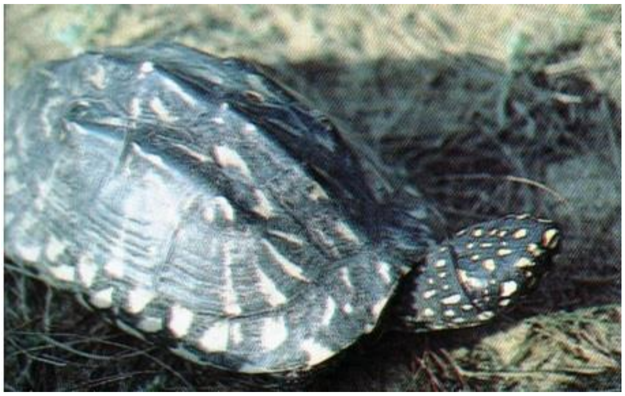
### I. Family Emydidae
### (Mud-Turtles)

#### ***1. Geoclemys hamiltonii*** (Gray)
(**Fig.4.1**)

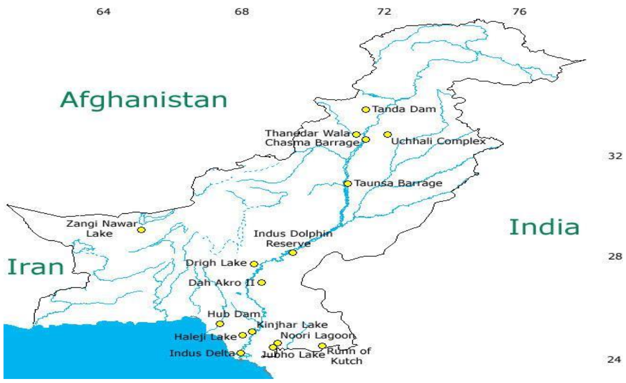
1 Carapace elongate, strongly convex with sloping sides, with 3 interrupted keels, formed by a series of node-like prominences on neural and costal plates.
2. First vertebral longer than broad, second and third broader than long.

3. Plastron deeply notched posteriorly, truncate anteriorly; large auxiliary and inguinal plates.
4. Head massive, snout short, posterior part of head with symmetrical large scales.
5. Digits webbed to the base of claws, limbs with broad scales.
6. Seam contact formula: 1>5<7<9<11<.
7. Plastral formula: abd>fem>pect> gul> an>hum.

   Male smaller with longer tail, arched plastron, tips of the anal plates pointed outward in female. Length 25-36 cm, weight 2-4.6 kg.



**A**



**B**

**Fig.4.1.** *Geoclemys hamiltonii* (Gray). B shows wetlands in Pakistan, natural habitats for inland turtles.

*Colour:*

Dark shell with yellow streaks and triangular marks. Dark head spotted with yellow, neck gray with white spots; dark forelimbs spotted with white.

*Habitat:*

Inhabits shallow ponds and pools, rivers.

*Range:*

Inhabits the flood plains of the Indus-Ganges-Brahmaputra. It has been reported from Nepal, Assam, Bihar, Jammu, Rajasthan, Uttar Pradesh, Western Bengal, and Jessore in Bangladesh. In Pakistan recorded from Tunsa Barrage, Saidabad, Balloki Headworks in Punjab; Jacobabad, Tharparker, and Sehwan in +Sindh.

### ***2. Hardella thurjii*** (Gray**)**
### **(Fig.4.2)**

1. The carapace extensively in contact with plastron through strong long buttresses extending on to the neurals. An interrupted neural keel is present.
3. Plastron is produced posteriorly into a narrow lobe.
4. Marginals are serrated in adult.
5. Neurals are broader than long.
6. Snout projecting, skin of its posterior half smooth.
7. Jaws serrated with broad triturating surface.
8. Limbs with narrow transverse rows of scales, digits are fully webbed.
9. Seam contact formula: 1<4>6>8>11<.
10. Plastral formula: abd>pect><fem>hum> an>gul.

    Female thrice bigger than male, reaches 15-23 cm in carapace length, while male is 10-15 cm long, with tail thick at its base. Female weighs 1.5-3 kg.

*Colour:*

Carapace dark brown with a grayish black vertebral keel; plastron yellow, scutes with large blackish blotches. Four yellowish orange stripes on sides of head and a similar stripe often present on forehead. Limbs brownish, edged with yellow.

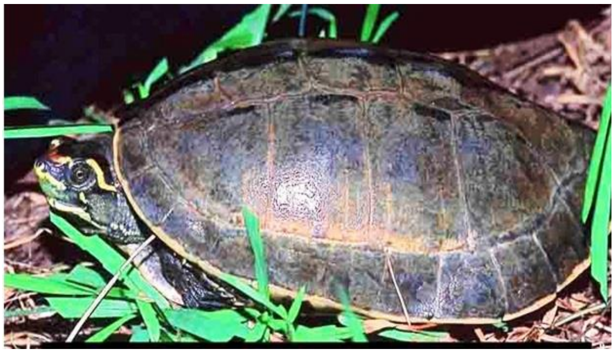


**Fig.4.2**. *Hardella thurjii* (Gray**)**.

*Habitat:*
Thoroughly aquatic, frequenting pools, ponds, canals, rivers with slow currents and lakes, seldom seen out of water, and it does not bask in winter; however, during drought it wanders in search of water and buries itself in moist debris at the bottom of drying ponds.

*Range:*
It is a widely distributed turtle in the flood plains of the Brahmaputra, Ganges, and Indus Rivers. In Pakistan it has been recorded from localities in Sindh and around Karachi.

### ***3. Kachuga smithii*** Gray

**(Fig.4.3)**

1. Carapace depressed, oval, strongly arched, highest at midpoint, margin flared, spine feeble.
2. Vertebrals longer than wide, except second and fifth which are wider than long, third quadrangular to pentagonal, 24 marginals.
3. Plastron truncated anteriorly but notched posteriorly.
4. Forehead with large irregular scales.
5. Snout projected anterior to lower jaw, upper jaw serrated, anteriorly notched.
6. Seam contact formula: 1M4>6M8<10>.
7. Plastral formula: abd>fem>hum>pect>an >gul.
   Shell length 23-24 cm.
   Male smaller than female, male has a longer tail with thick base.

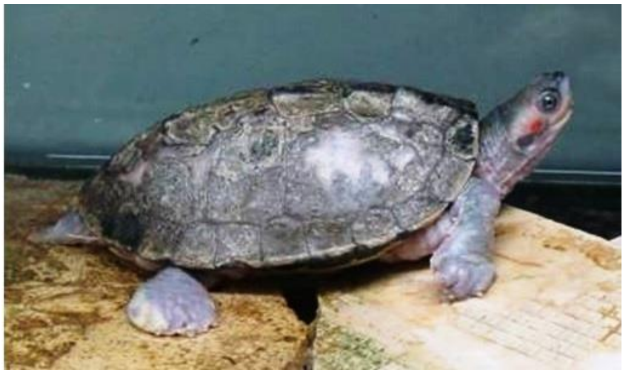


**Fig.4.3**. *Kachuga smithii* Gray.

*Colour:*
Iris pale green to blue. Carapace brown olive with black or dark brown vertebral stripe; a single, large black blotch on each plastral scute. Head olive, with a reddish brown blotch behind the eyes. Neck and limbs with yellowish blotches.

*Habitat:*
Characteristic turtle of flowing waters, however it has usually stay in lentic waters. A shy species, never attempts to bite.

*Range:*
Lower Sindh and Indus Delta, Pakistan.

### ***4. Kachuga tecta*** (Gray)

**(Fig.4.4)**

1. The carapace is dome-shaped, oval with a distinct neural spiked keel, which is more prominent on third vertebral scute; fourth vertebral is longer than wide, flask-shaped.
2. Plastron is truncate anteriorly, notched posteriorly.

3. Snout pointed, posterior half of head with irregular scales.
4. Upper jaw serrated with concave alveolar surface.
5. Seam-contact formula: 1>4M 6M 8M l0M.
6. Plastral formula: abd>fem>an><hum> an>gul.

   Maximum length 23 cm, weight 1.35 kg.

   Male is smaller, has longer tail which is thicker at its base, carapace is darker, iris red; while in female the carapace is paler and iris is pink.

*Colour:*
Carapace brownish, with a light brown, red, or orange stripe along first 3 vertebrals, marginals with narrow yellow border; plastron yellow or pink, with 2-4 black marks on plastral scutes; head with an orange or reddish crescent-shaped postocular mark, curves up from eyes to meet on forehead; neck dark with narrow yellow stripes.

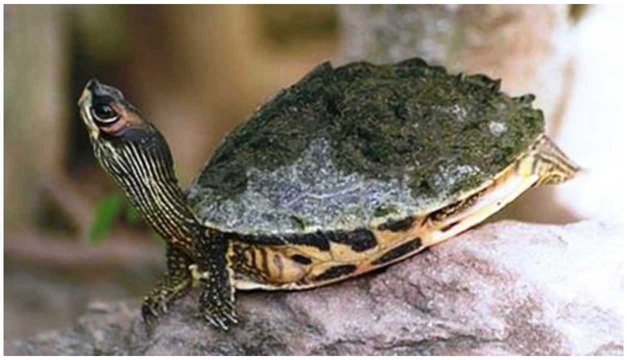


**Fig.4.4**. *Kachuga tecta* (Gray)

*Habitat:*
The sawback turtle frequents standing, slow moving water bodies and may invade large rivers. Basking turtles is a common sight during winter.

*Distribution:*
One of the most common turtles in the flood plains of the Ganges, Narmada, Brahmaputra, and Indus Rivers. It is widely distributed from Nepal, Bangladesh, and India throughout the Indus Valley in Pakistan.

## II. Family Trionychidae (Rivers and lakes)

### *1. Aspideretes gangeticus* (Cuvier)
(**Fig.4.5**)

1. Carapace low, oval, vertebral region depressed in adult.
2. Costals 8 pairs, the eighth meeting at midline, first separated by preneural and first neural plate.
3. Plastron much shorter than carapace, with 5 callosities.
4. Plastral bones strongly rugose in adult.
5. Head broad, massive, eyes dorsolateral, placed well anterior on snout.
6. Nasal septum with lateral ridges.
7. Few transversally enlarged scales on forelimbs, which have 2 claws.

   Sexually dimorphic, male with longer and thicker tail, vent near the tail tip.

   Maximum length 42-75 cm, weight 17 kg.

*Colour:*
Carapace dull olive to green, unicolor or with dark reticulation, plastron ivory, slightly grayish callosities; head and limbs sage green with dark mottling, head sometimes with black oblique stripes; iris greenish yellow flecked with black. Carapace of young bright green, with fine intricate black reticulation, 4 fairly distinct ocelli.

*Habitat:*
This huge soft-shell turtle inhabits rivers, lakes, and large permanent ponds where it remains buried in the bottom gravel. It is extremely aggressive, shooting out its neck to give a very painful bite. Once it gets a firm grip, it holds on and retracts its neck in an attempt to tear off what is in its jaws.

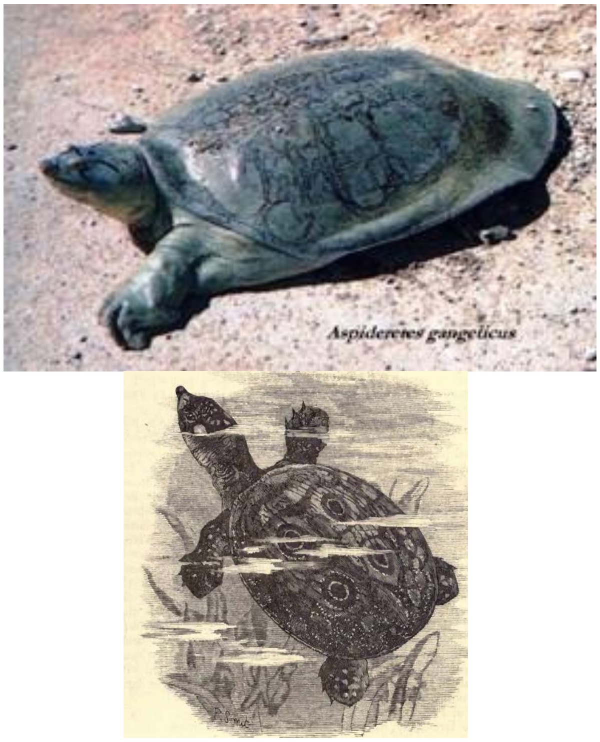


**Fig.4.5**. *Aspideretes gangeticus* (Cuvier)

*Distribution*:
This turtle is widespread in rivers, canals, and large lakes throughout the Indo-Pakistan subcontinent.

### *2. Aspideretes hurum* (Gray)
(**Fig.4.6**)

1. Carapace low, oval, with several longitudinal rows of tubercles on its posterior side.
2. A preneural and neural between first pair of costals.
3. Eighth pair of costals meet at carapace midline.
4. Plastral callosities 5, large.
5. Head large, with downward-bent snout.

   Sexually dimorphic, male with longer and thicker tail, anal aperture close to the tail tip.

   Maximum carapace length 40-60 cm.

*Colour:*
Carapace olive with yellow rim. Head and limbs olive, head with dark reticulation, and yellow blotches on snout, postocular, and tympanic regions. Plastron is light gray.

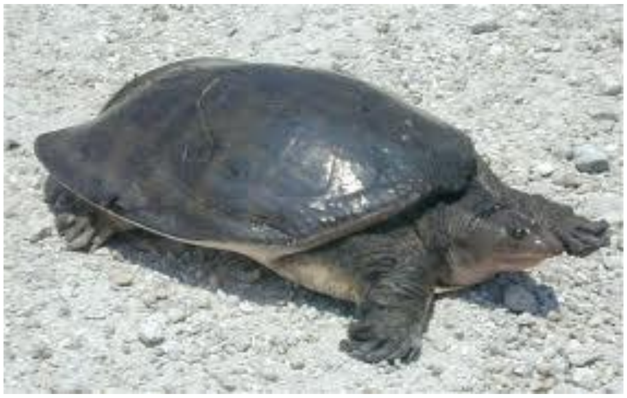


**Fig. 6.** *Aspideretes hurum* (Gray)

*Habitat:*
Little is known about the habits of this turtle. It inhabits rivers, lakes, and ponds. It is aggressive and bites with force; it is nocturnal and omnivorous.

*Distribution:*
Recorded from throughout India and Bangladesh, and in Pakistan it is known from the Indus and its tributaries.

### *3. Chitra indica* (Gray)
(**Fig.4.7**)

1. Depressed oval shell, with prominently pitted scutes.
2. Costals 8 pairs; a single neural between first pair of costals.
3. Plastral callosities 4.
4. Head extremely long and narrow, eyes situated close to the nostrils, proboscis short.

   Maximum size 35-115 cm, weight 120 kg.

   Male with longer tail which is thick at its base.

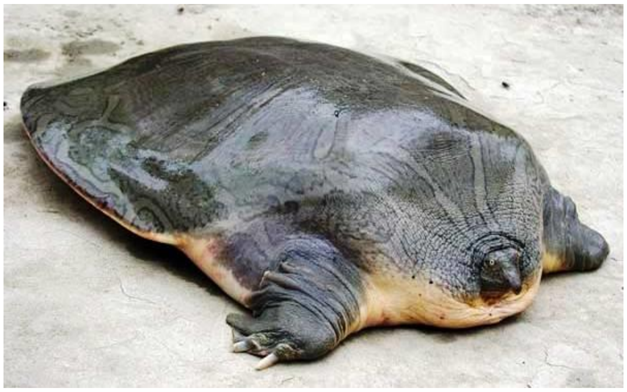


**Fig. 4.7.** *Chitra indica* (Gray)

*Colour:*
Carapace dull olive or bluish gray, with a pattern of wavy reticulations, neck, and forelimbs with similar pattern. A V-shaped mark starts from nape and extends to the carapace. Juvenile with 4 ocelli on carapace or numerous elongated black spots; plastron cream or pale pink.

*Habitat:*
This river turtle hunts in the more sandy shallow marginal parts of rivers. Its food consists of fish and crustaceans; snails have also been reported from its stomach. It is known to bury in bottom sand, keeping only its eyes exposed; as a passing fish approaches, it lunges and devours it. The dorsal pattern is an effective camouflage so that its prey is unable to detect it in natural environments. It feeds on fishes and molluscs (Das 1991),

This turtle is bad tempered; when disturbed, it lunges, when handled, it may exude a foul smell.

Clutch size ranges from 60 to 120 eggs, each having a diameter of 34 mm, and weighing 18-20 g.

*Distribution:*
This turtle is widely distributed in the river systems of the Oriental region, right from Thailand to Pakistan, where it is common in the Indus and its tributaries.

### *4. Lissemys punctata andersoni* Webb (**Fig.4.8**)

1. Shell low, oval, scutes with fine granulation and covered with soft skin.
2. Costals 8 pairs, last pair meet each other medially.
3. A small prenuchal present.
4. Callosities on plastron 7.
5. Plastron with hinged pectoral and femoral valves, under which hind limbs are withdrawn.
6. Anterior half of the shell hinged, can close the shell completely from anterior side, with neck safely withdrawn inside shell.
7. Tail short, does not extend beyond shell.
8. Limbs with 3 claws, fingers webbed.
   Males smaller 14-20 cm, weight 4.5 kg than females 17-28 cm, weight 7 kg. Male has longer tail.

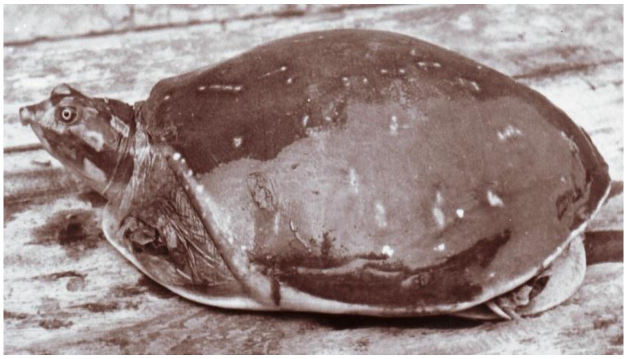


**Fig. 4.8.** *Lissemys punctata andersoni* Webb

*Colour:*
Shell light olive brown, with scattered bright yellow round dashed spots, sometimes carapace is with a yellow reticulation and edged with pale yellow; plastron cream; head and limbs gray, with bright yellow spots on head and neck.

*Habitat:*
This turtle is plentiful in the riparian system of the upper and lower Indus Valleys and

frequents muddy ditches, lakes, and marshes with considerable marginal vegetation.

*Distribution:*
*Lissemys punctata andersoni* is widely distributed in Bangladesh, Nepal, India, and Pakistan

## III. Family Testudinidae
**(**Tortoises)

.

### 1. *Agrionemys horsfieldii* (Gray)
(**Fig.4.9**)

1. Shell oblong, widest at the level of hind limbs, strongly arched, flattish at top.
2. Posterior margin of carapace distinctly flared and serrated.
3. Cervical scute long, narrow; neurals broader than long, 23 marginals, twelfth separated.
4. Plastron large, emarginated anteriorly, notched posteriorly.
5. Head moderately large, with scales on top and sides, single frontal and a large divided prefrontal.
6. Jaws not serrated, upper with 3 anterior cusps.
7. Fore- and hind limbs with 4 large claws.
8. Seam contact formula: 1>5<7<9<11<.
9. Plastral formula: Abd>gul><an>fem>pect.
   Female larger, with smaller tail. Male with concave plastron.
   Maximum size 16-22 cm, weight 1.50-3 kg.

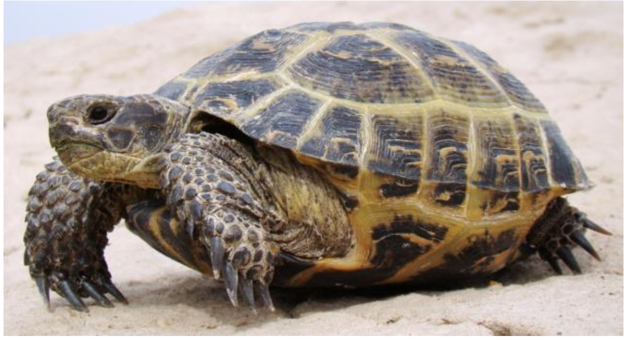


**Fig. 4.9.** *Agrionemys horsfieldii* (Gray)

*Colour:*
Carapace dark to light brown, without any definite pattern; plastron more or less diffusely and heavily clouded with dark brown; head and limbs dark gray to light yellowish; iris dark brown.

*Habitat:*
This tortoise frequents hilly and rocky terrain with clayey and sandy deserts, steppes, ephemeral communities at foothills, and semisteppes near oases.

*Distribution:*
A wide-ranging species, it is found from the Caspian Sea eastward through Khazakistan, through Iran, Afghanistan, and western China. In Pakistan it occurs throughout northern and western Balochistan and Waziristan.

### 2. *Geochelone elegans* Schopff
(**Fig.4.10**)

1. The shell is elongate, dome-shaped, flattened on sides, widest at the insertion of hind limbs. Its posterior sides are not flared.
2. Neurals and costal laminae umbovate, nuchal absent.
3. Marginals 23, the twelfth about twice the size of others.
4. Plastron with a small shallow anterior and a broad posterior notch.
5. Edges of jaws finely serrated, lower jaw with a central cusp.
6. Head with small scales, tympanum distinct.
7. Forelimbs with 5 claws, hind with 4.
8. Seam-contact formula: 1>5<6>8>11<.
9. Plastral formula: abd>hum>gul>fem>pect><an.
   Female exceeds male in body mass, male has longer tail, flattened shell top, concave plastron, and narrower postanal gap.
   Maximum carapace length 20-28 cm, weight 8 kg.

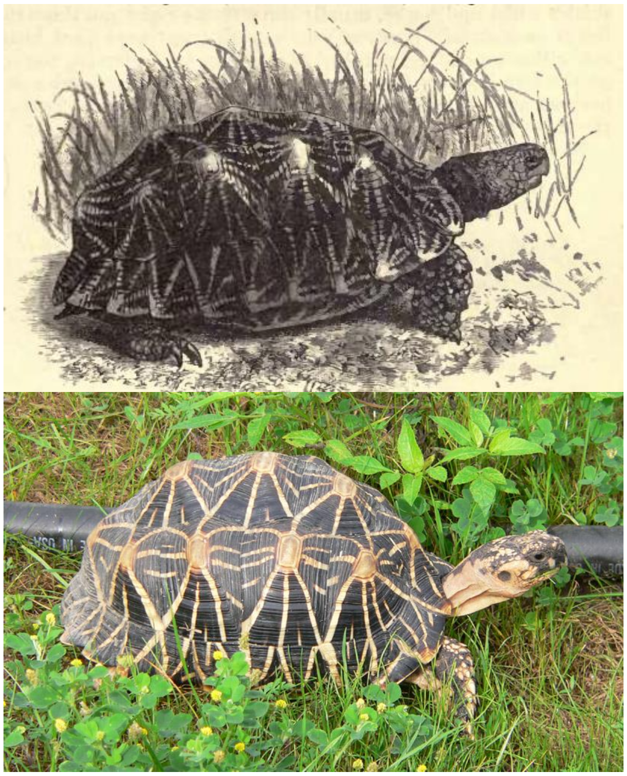


**Fig. 4.10.** *Geochelone elegans* Schopff

*Colour:*
Carapace dark brown to black; umbo on neural and costal laminae yellow with a series of 5-10 yellow stripes radiating from it; plastron plates with similar pattern; head and limbs dull yellow, spotted, mottled with black.

*Habitat:*
The star tortoise is mainly associated with dry scrub land, along the desert edge, tilled fields, grasslands, and thorn scrub wasteland.

*Distribution*:
The star tortoise is widely distributed in peninsular India and Sri Lanka. In Pakistan it is found around Karachi, where it lives in semidomesticated conditions. It has also been recorded from Kutch and Nagar Parker, southeastern Sindh.

## IV. Family Crocodylidae

### ***1. Crocodylus palustris*** Lesson
(**Fig.4.11**)

1. Snout long, flat, about 60% wider than long
2. Thecodont teeth in upper jaw 19, 15 in lower jaw, on each side, fourth and tenth are the largest.
3. Postoccipital plates small, arranged in a transverse series, followed by 5 large nuchals
4. Neural plates from neck to the level of vent 18, each plate sculptured by several ridges.
5. Rectangular abdominal plates 16 across midbelly.
6. Caudal segments 33, each with a series of 4 ridged plates on dorsal side, distal half of tail with plates with a single high ridge.
7. Fingers webbed at base, toes completely webbed, emarginate; a serrated fringe along the outer side of limbs.
   Maximum total size 3 m.

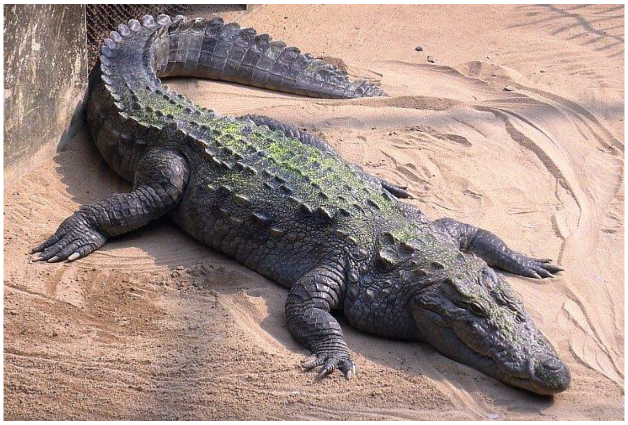


**Fig. 4.11.** *Crocodylus palustris* Lesson

*Colour:*
Dorsum light brown, with darker mottling to almost uniformly black.
*Habitat:*
The mugger inhabits rivers and lakes from plains up to 600 m of elevation. It is extremely shy; it does not like human company, and quickly takes to water. A basking mugger sits

on the sandy bank of a river, during early and late winter, facing river with its wide open mouth. It is a silent swimmer, floating quietly on the surface of 2 to 3 m deep water, with meager emergent vegetation. On land it rests on its belly, and drags it along; however, during running the belly is lifted clear off the ground. It excavates a 2-4-m long and 60-90-cm wide passage, like a burrow with a spacious terminal chamber on the banks of lakes in the Sindh Delta.

*Distribution:*

The mugger ranges from Assam through India, from Sri Lanka to westernmost Balochistan and eastern Iran. In India it inhabits all river systems and their connecting streams and all sizable ponds. While in Pakistan it is reported to inhabit the lower Indus Valley. A small group is on record in the Hub and Dasht Rivers, along the Makran coast. Few mugger are being maintained in a pond near Mangu (or mugger) Pir shrine near Karachi.

## V. Family Gavialidae

### *Gavialis gangeticus* (Gmelin)

(**Fig.4.12**)

1. Snout long, narrow, its length 5 times its breadth.
2. Teeth 27-29 teeth in the upper, 25-26 in the lower jaw on each side, first 3 fitting into notches in upper jaw.
3. A continuous series of 21-22 transverse rows of plates from nuchal to level of vent.
4. A pair of small postoccipital scutes.
5. Fingers webbed.

Males longer than females. During breeding season, the male develops a large hollow cartilaginous protuberance at tip of its snout, known as "ghara" from which name "gharial" is derived.

Maximum length 6.5 m.

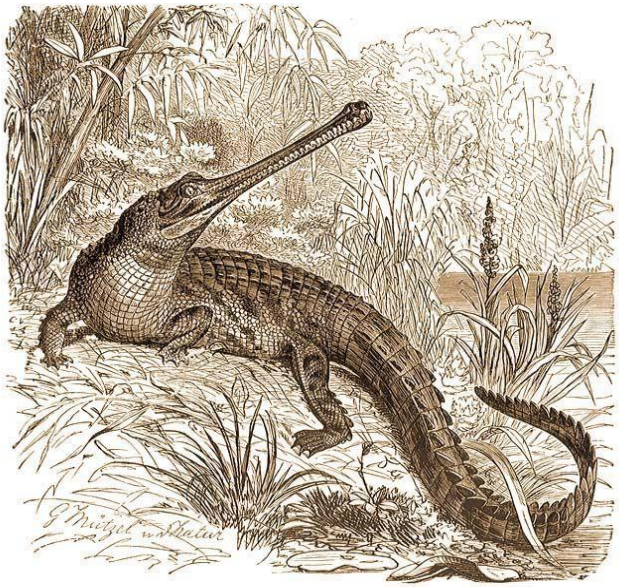


**Fig. 4.12.** *Gavialis gangeticus* (Gmelin)

*Colour*

Dark olive or brownish above, whitish or yellowish below. Young with spots or crossbars.

*Habitat:*

Restricted to deep fast-flowing rivers. About 100 years back, it was plentiful in the rivers of the Indo-Gangetic plains. Decline in its population occurred because of uncontrolled all-season hunting for hides, meat, medicine, and sport. Moreover, loss of habitat due to human activity and encroachment contributed to its extermination.

*Distribution:*

Occurs in pockets in the Gangetic plains in India. In Pakistan it is extremely rare, in not absent.

# APPENDIX
## Scientific, common English and Urdu names

| Scientific names | Common English | Roman Urdu | Urdu |
|---|---|---|---|
| **Turtles and tortoises** | **Turtles, Tortoises** | ***Kachway*** | کچھوے |
| **Family Cheloniidae** | **Bony Shelled Turtles** | ***Haddi pusht kachway*** | ہڈی پُشت کچھوے |
| *Caretta caretta* (Linnaeus, 1758) | Loggerhead | *Paan Samundri Kachwa* | پان سمندری کچھوا |
| *Chelonia mydas* (Linnaeus, 1758) | Green Turtle | *Mongia Samundri kachwa* | مونگیا سمندری کچھوا |
| *Eretmochelys imbricata* (Linnaeus, 1766) | Hawksbill | *Cheel-sar Kachwa* | جیل سر سمندری کچھوا |
| *Lepidochelys olivacea* (Eschscholtz, 1824) | Olive Ridley | *Zatooni Samundri kachwa* | زیتونی سمندری کچھوا |
| **Family Dermochelys** | **Lathery Turtles** | ***Khal- pusht Samundri Kachwa*** | کھال پُشت سمندری کچھوا |
| *Dermochelys coriacea* (Vandelli, 1761) | Leatherback Turtle | *Khal- pusht Samundri Kachwa* | کھال پشت سمندری کچھوا |
| **Family Emydidae** | **Webbed digit fresh water turtle** | ***Jhilly ungusht*** | جھلی اُنگشت |
| *Geoclemys hamiltonii* (Gray, 1821) | Yellow-spotted mud turtle | *Chitra Daryai Kachwa* | چتکبرا دریائی کچھوا |
| *Hardella thurjii* Gray, 1870 | Common mud Turtle | *Daryai Kachuwa* | دریائی کچھوا |
| *Pangshura smithii* (Gray, 1863) | Brown Mud Turtle | *Bhoora Daryai Kachwa* | بھورا دریائی کچھوا |
| *Pangshura tecta* (Gray, 1831) | Sawback Turtle | *Dranti-pusht Kachwa* | درانتی-پشت کچھوا |
| **Family Testudinidae** | **Land Tortoises** | ***Khushki kay kachway*** | کھچور (خشکی کے کچھوے) |
| *Agrionemys horsfieldii* (Gray, 1844) | Central Asian Tortoise | *Wasti-Ayshai Kachoor* | وسطی ایشیائی کھچور |
| *Geochelone elegans* (Schopff, 1792) | Star Tortoise | *Satara Kachoor* | ستارہ کھچور |
| **Family Trionychidae** | **Lathery Turtles** | ***Khal-pusht daryai kachway*** | کھال پشت دریائی کچھوے |
| *Nilssonia gangeticus* (Cuvier, 1825) | Indian Soft-shell | *Sindhi Prait* | سندھی پریت |
| *Nilssonia hurum* (Gray, 1831) | Peacock Soft-shell | *Basanti Prait* | بسنتی پریت |
| *Chitra indica* (Gray, 1831) | Narrow-head Soft-shell: | *Tang-sar Prait* | تنگ سر پریت |
| *Lissemys punctata andersoni* Webb, 1980 | Flapshell Turtle | *Moonji Kachwa* | مونجی کچھوا |
| **Crocodyles and Gavials** | | | مگرمچھ اور کھڑیال |
| **Family Crocodylidae** | **Crocodyles** | ***Maggar Mach*** | مگرمچھ |
| *Crocodylus palustris* Lesson, 1831 | The Mugger | *Maggar Machh* | مگرمچھ |
| **Family Gavialidae** | **Gavials** | ***Ghahrial*** | گھڑیال |
| *Gavialis gangeticus* (Gmelin, 1789) | Gharial | *Sassar, Ghahrial* | گھڑیال، سسار |

# PART-III

## LIZARDS

*Eublepharis macularius*

naturephoto.cz

*Varanus bengalensis*

# Chapter 5

## Geckos: Eublepharidae

Family Eublepharidae ..................................... 53

Family Gekkonidae......................................... 54

### Family Eublepharidae

Eyelids movable; *digits* not dilated, straight ........................ *Eublepharis macularius*

#### ***Eublepharis macularius*** (Blyth)
(**Fig.5.1**)

Single row of broad subdigital lamellae.
Body with granular scales, interspersed with round tubercles.
Un-regenerated tail plump, distinctly broader than body, small subcaudals.
Male 9-14 preanal pores.
Snout-vent length 120-158 mm, tail 89-93 mm**.**

*Colour:*
Body in juvenile light brown, yellowish or pinkish with broad crossbars, sometimes with intervening dark brown spots. Head brown, tail ringed with light and dark; older specimens the bars on body are broken into spots. Head spotted, sometimes a U-shaped mark on the nape.

*Habitat*:
Common in stony country sides; inhabits rocky stony terrain, mudflats with sparse grass and bushes, in mesic to xeric conditions. Gregarious: several lizards live in colonies in holes in the ground, under stones, and crevices among rocks, especially in stone walls demarcating fields or houses.

*Range:*
From Rajputana and Khandesh District of India, in Pakistan recorded from Azad Kashmir, Khyber Pakhtunkhwa, northern Punjab, Balochistan, and lower Sindh.

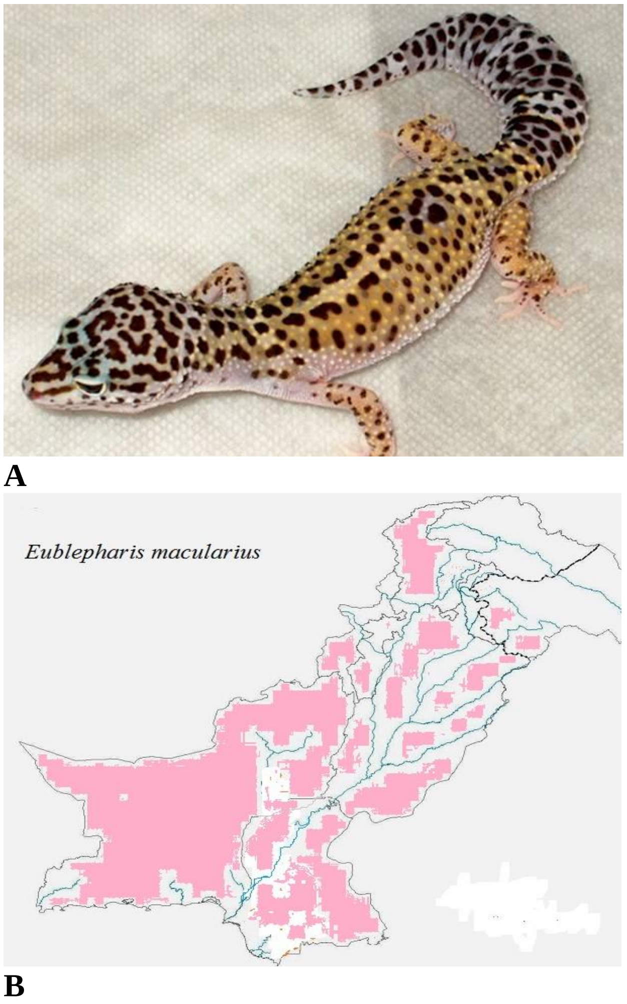


**Fig.5.1.** *Eublepharis macularins* (Blyth). B shows distribution of the species in different part of Pakistan.

## Family Gekkonidae

There are 14 genera of this family in Pakistan.

1. Genus ***Agamura*** Blanford, 1874
Long slender limbs; digits thin, cylindrical at base, distally angularly bent, slightly compressed; claws between two enlarged scales; subdigital lamellae transverse, smooth; no enlarged postmental shields; dorsal scales granular, intermixed with small round tubercles; tail cylindrical; at base strongly narrowed in diameter; not longer than snout-vent length, autotomizes only at the base; a row of more or less rounded subcaudals.

2. Genus ***Altigekko*** Khan, 2003.
Body and tail depressed, tail a little longer than body, segments marked by lateral lobulations in the anterior half of un regenerated tail, fragile at its base, regenerated tail much swollen, caudal tubercles small, conical, protuberant given from the middle of segments, indistinct by midtail; subcaudals in several rows; postfemoral tubercles absent; dorsal granular scales convex, mostly juxtaposed, arranged in lateral transverse rows, interspersed with thrice large convex, smooth or feebly keeled oval tubercles arranged in more or less longitudinal rows, rare on head and limbs. no supracilliary spines on the posterior dorsal part of the upper eyelid; a distinct frontal and postnasal pit. Interorbital scales 16-20; scales across midabdomen 27-32, midventrals 117-150; preanal and femoral pores not indicated in both sexes (Gruber, 1981; Khan, 1992).
Three species in Pakistan.

3. Genus ***Bunopus*** Blanford, 1874
Digits straight, without angular bend, clawed; subdigital lamellae transverse, tuberculated; body dorsum with juxtaposed small scales, intermixed with larger keeled, slightly trihedral flattish tubercles; tail cylindrical, round in cross section, segmented, 2-3 whorls of caudal scales in a segment and one whorl of caudal tubercles, which are in close contact with each other;

enlarged subcaudals may be present or absent; enlarged postmental may be present or absent; male with 4-6 preanal pores.

Anderson (1999) determined the holotype of *Crossobamon lumsdeni* as *Bunopus tuberculatus.*

A single species represented in Pakistan.

4. Genus ***Crossobamon*** Boettger, 1888

Digits straight, comb like scales projecting on each side; transverse multileveled subdigital lamellae; dorsum with small imbricate keeled scales intermixed with larger flattish keeled tubercles; no distinct postmental scale; preanal pores in male present.

Three species represented in Pakistan.

5. Genus ***Cyrtopodion*** Fitzinger, 1843

Dorsum with typical trihedral tubercles arranged in regular longitudinal rows, bigger than interspaces between them; caudal tubercles mucronate, laterally broadly in contact with each other; male with preanal, rarely with femoral pores; a single row of transversally enlarged subcaudals (Khan 2001a). There have been several attempts to group these geckos (Annandale 1913; Smith 1935; Szczerbak and Golubev 1986; Khan 2001a; Khan and Rosler 1999; Anderson 1999).

6. Genus ***Hemidactylus*** Oken, 1817

From dilated basal part of digits distal phalanges arise angularly, digits covered with scales, not denticulate; all digits clawed; dorsum with uniform granular subimbricate scales, some times mixed with round enlarged tubercles.

Seven species known from Pakistan.

7. Genus ***Indogekko*** M. S. Khan, 2003

Sand-stone geckos (Khan, 2001). Large, thin geckos, with body and tail depressed, tail quadrangular, fragile at any point along its length, much longer than body, with very gradual taper; three rows of flat, keeled laterally flared caudal tubercles, twice broadened subcaudals in a single series, two to a segment, laterally flanked by a row of elongated scales; supracilliary spines present on the posterior dorsal part of upper eyelids; limbs and digits long, tips of fingers reach snout tip or beyond. Dorsal granular scales flat, pentagonal, juxtaposed, laterally arranged roughly in transverse rows, interspersed with 2-3 times larger, flat, round to oval, smooth or slightly keeled tubercles. Interorbital scales 13-18; 2, mostly 3 pairs of postmentals, first in contact by a long suture; scales across mid abdomen 23-28; mid ventral scales 129-132; postfemoral tubercles absent; a continuous series of 4-9 preanal and 6-9 femoral pores in male (in some species female may have preanal and femoral pores).

Four species in Pakistan.

8. Genus ***Mediodactylus*** Szczerbak and Golubev, 1977

*Diagnosis*:

Male with no more than 10 preanal pores, no femoral pores; first pair of postmentals in contact; dorsal tubercles oval or roundish, smooth; caudal tubercles spiny, do not contact each other; a row of enlarged subcaudals; supracilliary spines present.

A single species in Pakistan.

9. Genus ***Ptyodactylus*** Goldfuss, 1820

Digits free, cylindrical at base, tips strongly dilated laterally; a series of subdigital lamellae under cylindrical basal part, while two diverging series on distal dilated part, a small fissure between two series; claws

retractile between scales in the anterior notch in the apical expansion; dorsum with smooth juxtaposed, uniform granular scales, abdomen with subimbricate scales; tail subcylindrical, tapering.
A **s**ingle species known from Pakistan.

10. Genu**s** ***Rhinogekko*** de Witte, 1973
Nostrils are carried at the tip of a prominent cylindrical caruncle on lateral side of snout, formed by three nasal and first supralabial, which are drawn into a prominent narial spout; digits straight, cylindrical, slightly compressed, with a row of smooth transverse lamellae; a row of enlarged subfemoral scales; tail thin, cylindrical, with a row of irregular squarish larger subcaudals; male with preanal pores. The morphology of narial region of these geckos is enough to distinguish them from rest of the geckos.
One species occurs in Pakistan.

11. Genus ***Siwaligekko*** M. S. Khan, 2003
*Tibetanus* subgroup (Khan, 2001). Medium size geckos. Body and tail plump, nearly round, shorter or subequal of body, not whip-like, segmentation indistinct, indicated by minute blunt 2-3 tubercles in anterior half of the tail; tail fragile at base, regenerated tail not swollen, subcaudals indistinct; no supracilliary spines on the posterior dorsal part of the upper eyelids; dorsal granular scales round to polygonal, juxtaposed, beaded (convex), interspersed with three to four times large beaded smooth or slightly keeled tubercles, extending on neck and head, absent from limbs; postfemoral tubercles absent; interorbitals 21-35; midabdominals 36-56; midventrals 149-205; subdigital lamellae under basal part of digits somewhat broad, those under angular part narrower; subdigital lamellae under 4th toe 14-21; male with 8-10 preanal pores, no femoral pores, both absent in female.
Three species in Pakistan

12. Genus ***Teratolepis*** Günther, 1870
Subdigital lamellae keeled, not divided; supranasal scales large, flat, does not line nostril; body with flat, rhomboid, imbricate, keeled or smooth scales; dorsal and abdominal scales subequal; no distinct subcaudals; tail cylindrical, slightly thicker and flat at the base, thinning at its last quarter, covered above and below by flat imbricate scales.
A **s**ingle species occurs in Pakistan.

13. Genus ***Teratoscincus*** Strauch, 1863
Digits straight, not bent or dilated, all clawed, with a lateral fringe of long pointed scales; subdigital surface with minute granules; body covered with uniform, cycloid, imbricate scales; tail covered above with large flat nail like transverse plates; male without preanal and femoral pores.
Two species occur in Pakistan.

14. Genus ***Tropiocolotes*** Peters, 1880
Small geckos, rarely exceeding 35 mm in snout-vent length; digits with slight angular bent, cylindrical, without a fringe, with a single series of transverse subdigital lamellae; dorsum with small, uniform, homogenous imbricate scales; postanal sacs present; in male preanal and femoral pores absent.
Three species in Pakistan.

**Key:**

1. Digits dilated ............................................2
   Digits not dilated....................................10
2. Dilated part of the digit confined to the terminal phalanx .*Ptyodactylus homolepis*
   Dilated part of the digit extends along the whole digit ...............................................3

3. Tail swollen, covered with large flat imbricate scales; subdigital lamellae undivided ..................... *Teratolepis fasciata*
   Subdigital lamellae divided ....................... 4
4. Dorsum with keeled enlarged tubercles, arranged in regular rows ............................ 5
   Dorsum with hemispherical keelless tubercles irregularly arranged or absent ........8
5. Dorsal pattern of clearly defined broad dark saddles...................... *Hemidactylus triedrus*
   Dorsal pattern of small spots, or uniformly colored ...................................................... 6
6. Six to 10 lamellae under 4th toe, males with precloacal and femoral pores.......................... *Hemidactylus brookii*
   Nine to 15 lamellae under 4th toe; males with precloacal pores only ......................... 7
7. Eleven to 15 lamellae under 4th toe; 6 to 9 precloacal pores .......*Hemidactylus persicus*
   Nine to 12 lamellae under 4th toe; 4 to 6 precloacal pores ....... *Hemidactylus turcicus*
8. Inner toe less than half the length of second toe; a continuous series of 23 to 33 preano-femoral pores ...........*Hemidactylus frenatus*
   Inner toe more than half the length of second toe; precloacal and femoral pores separated by at least six scales................... 9
9. Dorsum with tubercles; 20 or more femoral pores; 12 or fewer lamellae under 4th toe ...................*Hemidactylus leschenaultii*
   No dorsal tubercles; femoral pores 15 or less; 12 to 15 lamellae under 4th toe ......................*Hemidactylus flaviviridis*
10. Digits straight.......................................... 11
    Digits angularly bent between last and penultimate phalanx................................ 16
11. Toes fringed on sides with pointed flexible long scales............................................... 12
    Toes not fringed so…*Bunopus tuberculatus*
12. Several series of large, thin scales on tail dorsum; habitus robust............................. 13
    Tail dorsum with small scales; habitus slender..................................................... 14
13. Body with large cycloid scales, 30 to 35 round midbody ......... *Teratoscincus scincus*
    Body scales small, 100 or more round midbody ............. *Teratoscincus microlepis*
14. Unregenerated tail shorter than body; in male fewer than five precloacal pores ...................... *Crossobamon orientalis*
    Tail longer than body; precloacal pores six or more ....................................................15
15. Dorsum with numerous tubercles; dorsal pattern of transverse bands.......................... ......................... *Crossobamon lumsdeni*
    Few or no dorsal tubercles; dorsal pattern of longitudinal stripes.......................................... .......................... *Crossobamon maynardi*
16. Body and tail depressed; tail longer than body.........................................................19
    Body and tail cylindrical, equal or subequal in length...................................................17
17. Three nasal scales; dorsal pattern of transverse bands which are much narrower than interspaces, tending to break in spots on sides........................ *Siwaligekko mintoni*
    Two nasal scales; dorsal pattern of transverse bands, band as broad or broader than interspaces .......................................18
18. Dorsal bands broader than interspaces; mid-ventrals 85 to 162 ................................ ........................ *Siwaligekko dattanensis*
    Dorsal bands breaking into a reticulum; mid-ventrals 194 to 205 .............................. ......................... *Siwaligekko battalensis*
19. Tail with even taper; limbs small, heel not reaching axilla ..........................................22
    Tail tapering abruptly; limbs long and slender; heels reaching axilla or beyond .... 20
20. Nasal scales strongly projecting vertically carrying naris at higher level....................... ........................... *Rhinogekko misonnei*
    Nasal scales not as above .........................21
21. A row of enlarged scales under the thigh; tail longer than snout-vent length ............................*Rhinogekko femoralis*
    No enlarged scales under thighs; tail

shorter than snout-vent length .................... ................................. *Agamura persica*

22. Body non tuberculated ............................ 23
    Body tuberculated .................................. 24
23. Internasals not differentiated from surrounding scales; four scales border naris ...................... *Tropiocolotes depressus*
    Internasals well differentiated, followed by a second pair of large scales; 5 scales border naris ............. *Tropiocolotes persicus*
24. Trihedral tubercles on body and tail; body moderately depressed .............................. 25
    Trihedral tubercles on tail only; body much depressed ................................................ 31
25. Interspaces between tubercles much smaller than size of the tubercles ............. 26
    Interspaces as large as or larger than size of the tubercles ............................................ 27
26. Interorbital scales more than 14; dorsal tubercles usually in contact with each other; mid-ventrals more than 120; snout-vent length less than 48 mm ....................... ............ *Cyrtopodion montiumsalsorum*
    Interorbital scales less than 14; dorsal tubercles always separated by 1 to 3 granular imbricate scales; midventral scales less than 120; snout-vent length more than 50 mm ............ *Cyrtopodion kohsulaimanai*
27. Two whorls of subcaudals to a caudal segment ................................................... 28
    Three whorls of subcaudals to a caudal segment ............. *Cyrtopodion agamuroides*
28. Subcaudals small, as broad as long, in two rows ....................... *Cyrtopodion kachhense*
    Subcaudals broader than long, in a single row ......................................................... 29
29. Scales across mid-abdomen less than 25 ........................... *Cyrtopodion scabrum*
    Scales across mid-abdomen more than 25 .. 30
30. 25-33 scales across mid-abdomen .................... *Cyrtopodion potoharensis*
    30-40 scales around mid- abdomen ............ ............................ *Cyrtopodion watsoni*
31. Caudal tubercles trihedral, arising from last annulus of caudal segment ....................... 32
    Caudal tubercles non-trihedral, arising from center of caudal segment ................. 35
32. Only precloacal pores present in males ....................................................... 33
    Precloacal and femoral pores present in males ....................................................... 34
33. Flat dorsal tubercles keeled .......................... ............................. *Indogekko indusoani*
    Dorsal tubercles feebly keeled or keelless ..................... *Indogekko fortmunroi*
34. 16-18 scales across mid-abdomen; 92-106 midventral scales...... *Indogekko rhodocaudus*
    21-25 scales across mid-abdomen; 102-132 midventral scales ..... *Indogekko rohtasfortai*
35. Dorsal tubercles round with raised center ...................................................... 36
    Dorsal tubercles flat, with or without keel ......................................................... 37
36. Unregenerated tail flat, laterally deeply sected, subcaudals Indistinct ....................... ................................. *ltigekko stoliczkai*
    Tail quadrangular, a distinct row of subcaudals .................. *Mediodactylus walli*
37. 158-171 midventrals.... *Altigekko baturensis*
    109 mid-ventrals............. *Altigekko boehmei*

### 1. *Agamura persica* (A. Duméril)

**(Fig.5.2)**

Femoral and preanal pores absent; femoral if present, not more than four.

Ventral scales in 23-26 rows across midabdomen.

Tail as long as body, tip blunt.

Snout-vent length 65 mm, tail 65 mm.

*Colour:*

Dorsum light gray with yellowish tinge. Five dark gray crossbars on body, as broad as or slightly narrower than interspaces, 9-10 on tail. Belly dirty white, flecked with gray. In young, bands darker dotted with light.

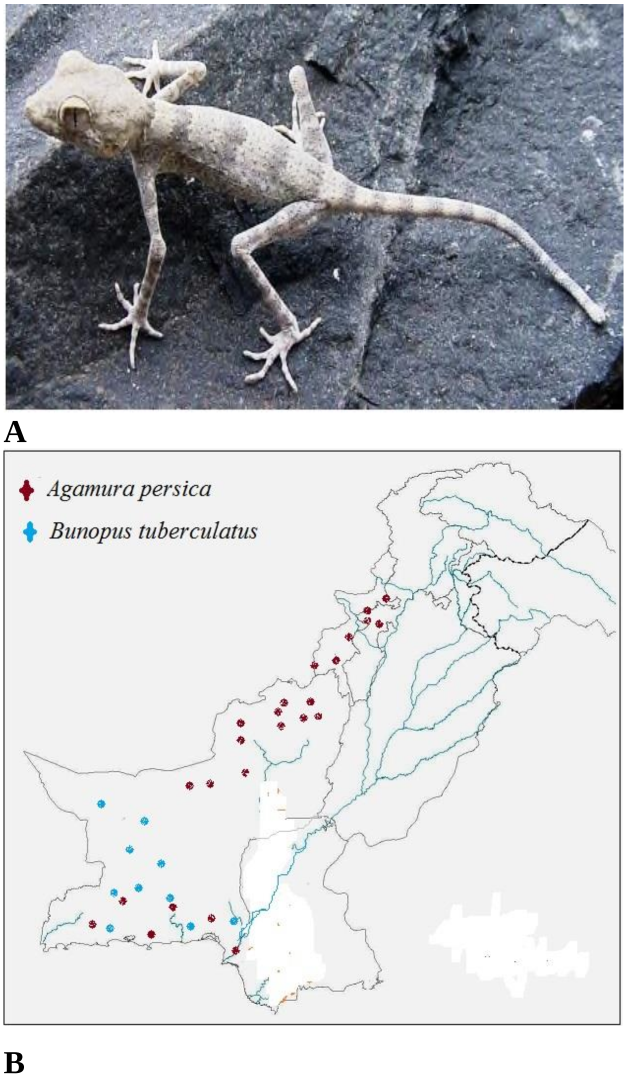


**Fig.5.2.** **A**, *Agamura persica* (A. Duméril). B, shows distribution of *Agamura persica* in different regions of Pakistan.

*Habitat*:

Collected from rocky, stony terrain close to sandy semi-desert, and in crevices on the slopes of hills at 30-100 m of elevation. The gecko is sluggish, essentially nocturnal, however, may be active during the day.

*Range:*

Reported from Iran, and extends eastward to near Karachi and northward to the Waziristan Hills, between 25 and 100 m of elevation.

### ***2. Altigekko baturensis*** (Khan and Baig)

**(Fig.5.3)**

Interorbitals 16-20.

Dorsal granular scales interspersed with flat thin weakly keeled tubercles, in 11-12 longitudinal rows at midbody.

Scales across midabdomen 26-30.

Scales along body midventrum 149-171.

No preanal or femoral pores.

Caudal tubercles flat, arising from the middle of tail segments.

Subcaudals small.

Snout-vent length 50-53 mm, tail 51-54 mm.

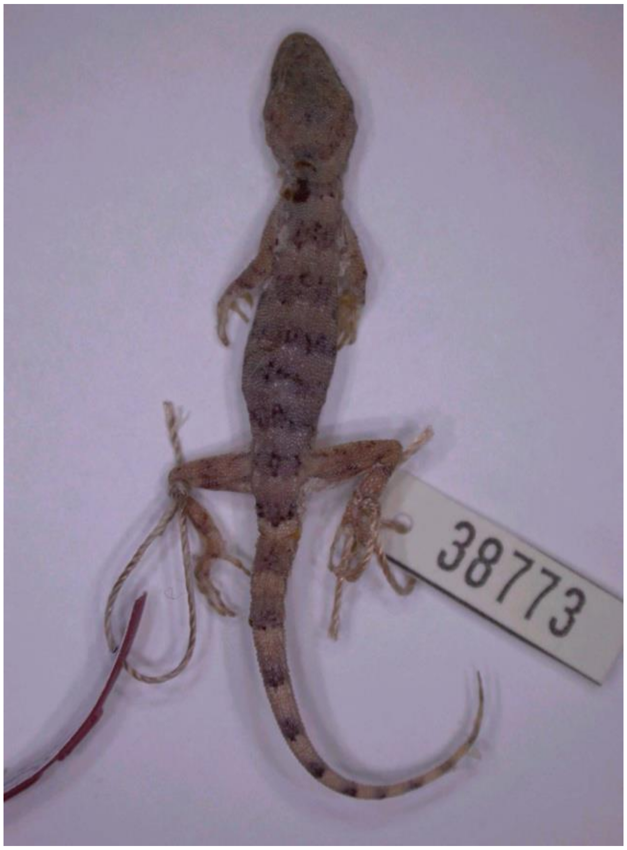


**Fig.5.3.** *Altigekko baturensis* (Khan and Baig)

*Colour:*

Dorsum light gray, with wavy-margined faint transverse bars on nape, neck, 4 on body, one at the pelvis and the last one at the level of the vent. Tail with transverse dark bars.

*Habitat*:
Picked from crevices in stone wall of thatched huts, from under stones and other debris in an area of sparse grass and low bushes.

*Range:*
Gilgit Agency, northeastern Pakistan.

### 3. *Altigekko boehmei* (Szczerbak)

Supralabials 8-9; infralabials 6-7; interorbitals 20; nasals 3; postmentals in three pairs, scales of first pair broadly in contact with each other.
Midventral scales 109-112.
Finger tips of adpressed forelimbs reach to snout tip, toes of hind limbs to mid-neck; 22 subdigital lamellae under 4th toe. Snout-vent length 34-39 mm, tail length 35-50.

*Colour:*
Body light dark with 6-7 darker transverse bands, 11-12 similar bands on tail.

*Ecological notes:*
A gecko of snowfields, inhabiting holes and crevices among walls of stone built huts and houses.

*Range:*
Known from Skardu, Ladak, northeastern Pakistan, at 2300 m.

### 4. *Altigekko stoliczkai* (Steindachner)
(**Fig.5.4**)

Body and tail moderately depressed, tail a little longer than body, laterally deeply sected in anterior half.
Subcaudals in several series.
Body with flat, mostly juxtaposed granular scales, arranged in transverse rows, interspersed with flat smooth oval tubercles, about three times larger than granular scales.
Interorbital tubercular scales 16-20.
27-32 scales across midabdomen, 117-150 midventral scales from postmentals to anterior lip of cloaca.
Both preanal and femoral pores not indicated.
Snout vent length 48, tail length 52 mm.

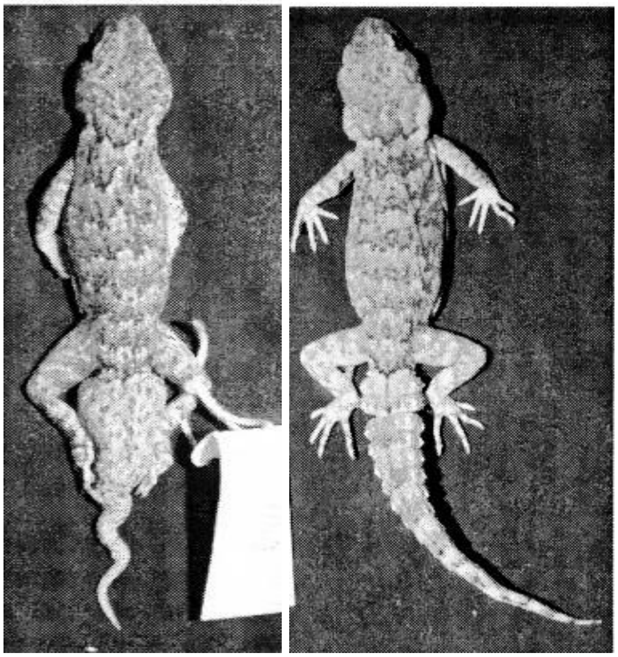


**Fig.5.4.** *Altigekko stoliczkai* (Steindachner)

*Colour:*
Body light blue or gray, with pink edged transverse irregular bands, with denser wavy posterior edges, broader than interspaces: three on nape, six on body and 13 on tail (on preservation bands are dark). Head, labials and tail plates with fine gray dots, limbs and digits barred, ventrum light.

*Ecological Notes:*
Collected from rocky habitat, in bare, dry situations in the non-irrigated areas without or with very sparse vegetation, apparently avoiding direct neighborhood of human settlements.

*Range:*
Widely distributed in Baltistan, northeast

Pakistan. Recently it has been recorded from upper Indus

### *5. Bunopus tuberculatus* Blanford

(**Figs.5.5 & 5.2B**)

No postmental.

Digits straight, distal phalanx not compressed.

Subdigital lamellae with a single series of minute tubercles.

Male with 5-6 preanal pores.

Snout-vent length 50-52 mm, tail 59-60 mm.

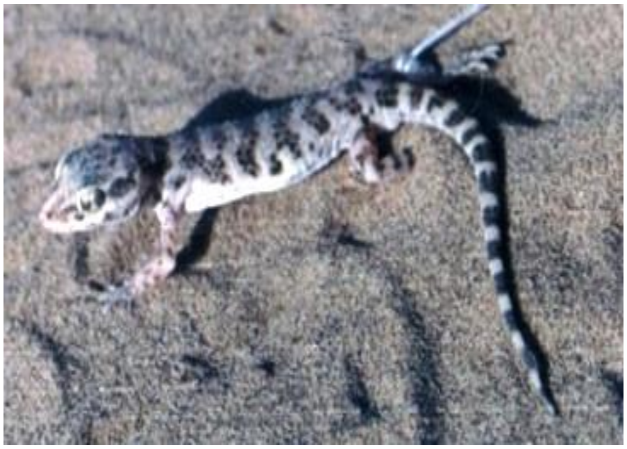


**Fig.5.5.** *Bunopus tuberculatus* Blanford

*Colour:*

Dorsum light grayish to pale brown, with 6 indistinct light gray crossbars, broader than interspaces. A brown crescentic curve around nape passes through eye. Labials barred. Limbs mottled or barred. Tail barred above, flecked below, belly white.

*Habitat*:

A true psammophilous essentially a nocturnal species, extracted from burrows among roots of shrubs in sand dunes. In mountainous region with sandy soil, inhabits crevices in the rock or brick walls of dikes built around salt lakes known locally as "*hamuns",* crevices under bridges, and fissures in soil.

*Range:*

Ranges from Syria, Iraq, eastern Arabia, southern Iran, to southern Afghanistan. In Pakistan it is common in Balochistan, to southern Sindh, Las Bela, and around Hyderabad, below 2000 m.

### *6. Crossobamon lumsdeni* (Boulenger)

(**Fig.5.6**)

Length of snout greater than distance between eye and ear opening.

Hind limb reaches beyond axilla.

Abdominals smooth.

Dorsal tubercles numerous.

Head with irregular scales.

Snout-vent length 33-38 mm, tail 40-42 mm.

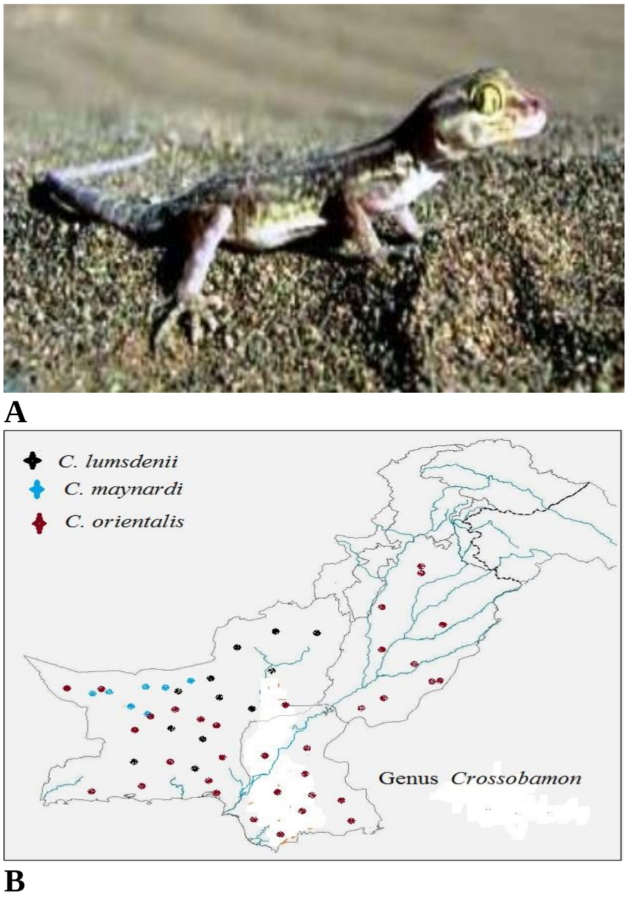


**Fig.5.6.** *Crossobamon lumsdeni* (Boulenger). B, shows distribution of species of Genus *Crossobamon*

*Colour:*
Dorsum sandy gray, with 7 distinct brownish crossbars, which are broader than interspaces. Body ventrum white.

*Habitat*:
A true psammophilous essentially a nocturnal species. It lives in burrows at the roots of bushes and grass among packed and semi-packed sand dunes., and feeds on different arthropods and their larvae.

*Range:*
Recorded in Pakistan between Nushki and Helmand in northern Balochistan.

### *7. Crossobamon maynardi* (Smith)
(**Figs.5.7 & 5.6B**)

Snout is longer than distance between eye and the ear opening.
Supralabials13-15, infralabials 12-13.
Belly with small round keeled scales.
Hind limb reaches to axilla.
Toes with marked lateral denticulations.
Male with 9 preanal pores, female with 9 enlarged pitted scales.
Snout-vent length 69-70 mm, tail 75-76 mm.

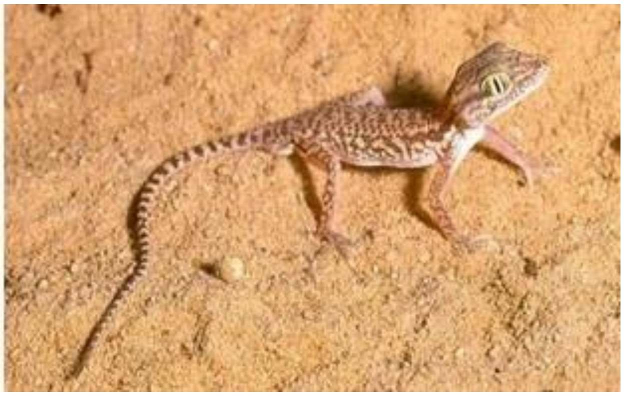


**Fig.5.7.** *Crossobamon maynardi* (Smith)

*Colour:*
Three yellow irregular stripes, with brownish black bands, from head to tail. Ventrum slightly pinkish.

*Habitat*:
It excavates burrows in the roots of vegetation and feeds on desert arthropods. When encountered it runs to the nearby shelter, spraying sand behind.

*Range:*
The striped sand gecko has been collected from northwestern Balochistan.

### *8. Crossobamon orientalis* (Blanford)
(**Fig.5.8**)

Snout about as long as distance between eye and the ear opening.
Supralabials 11-13, infralabials 9-11.
Head scales fairly uniform, flat or feebly keeled.
Abdominal scales small, round and keeled.
Hind limb reaches to the axilla.
Toes long, with well-marked lateral denticulations.
Male with 1-4 preanal pores.
Snout-vent length 47-49 mm, tail 48-50 mm.

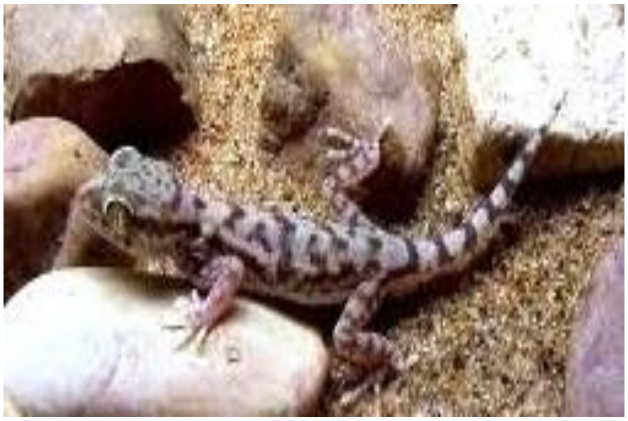


**Fig.5.8.** *Crossobamon orientalis* (Blanford)

*Colour:*
Dorsum pale sandy, with indistinct dark crossbars. A dark line from eye to the sides of the body. Dorsal tubercles dark brown. Ventrum whitish.

*Habitat*:
Its burrows in open sand close to vegetation, the burrow has a large round opening. Most of the day it stays close to the opening, catching passing insects.

*Range:*
Widely distributed throughout the Thar, Cholistan, and Thal Deserts, Sindh Delta and Las Bela, southern Balochistan.

### *9. Cyrtopodion agamuroides* (Nikolsky)

(**Fig.5.9**)

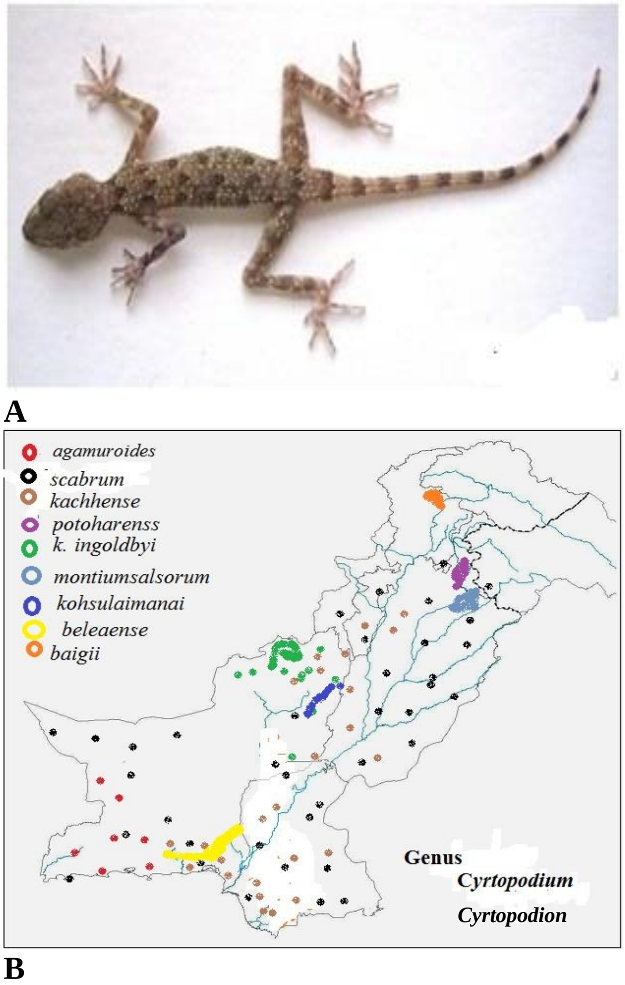


**Fig.5.9.** *Cyrtopodion agamuroides* (Nikolsky). B shows distribution of various species of Genus *Cyrtopodion*

Nasal scales 3.
Scales with preanal pores are much larger than surrounding scales.
Transverse rows of subcaudal scales under a caudal segment 3.
Scales across midbelly 28.
Male with 2-4 preanal pores.
Snout-vent length 38-40.2 mm, caudal length 49-50 mm.

*Colour:*
Khaki brown dorsum with 7 cross rows of 3-5 dark brown spots arranged between neck and the level of vent. Tail with 13 thick bars; 4-5 bars on limbs; ventrum white.

*Habitat*:
Collected from different situations in barren scrubland to rocky cliffs. It is nocturnal and very agile on rocks during the night, jumping from one rock on to another.

*Range:*
From southeastern Iran to Las Bela.

### *10. Cyrtopodion kachhense kachhense*

(Stoliczka)

(**Figs.5.10 & 5.9B**)

Subcaudals small, not broader than adjacent scales.
Scales across midabdomen 30.
Dorsal tubercles subtrihedral.
Snout-vent length 37-40 mm, tail 40-45 mm.
*Colour:*
Dorsum yellowish gray, with irregular dark brown spots, tail barred.

*Habitat*:
It lives in cracks and holes in ground, readily colonizing crevices among rocks and nearby houses, and crevices under bridges and walls.

*Range:*
Collected from most of Kutch, coastal Sindh, and Las Bela, Pakistan.

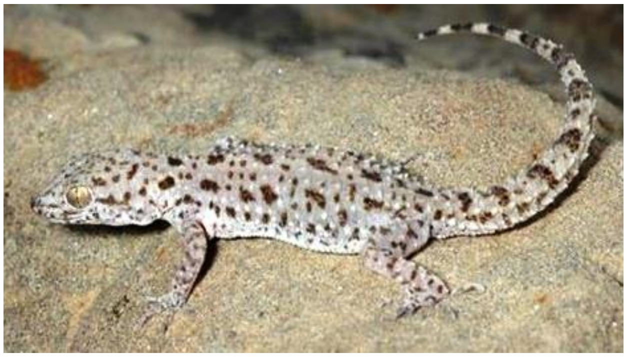


**Fig.5.10.** *Cyrtopodion kachhense kachhense* (Stoliczka)

### *11. Cyrtopodion kachhense ingoldbyi* Khan
(**Figs. 5.11 & 5.9B**)

Dorsum with trihedral tubercles, the sides of which are bowed in so that the tubercle has a sharp median longitudinal keel.
Interparietal scales 14-16.

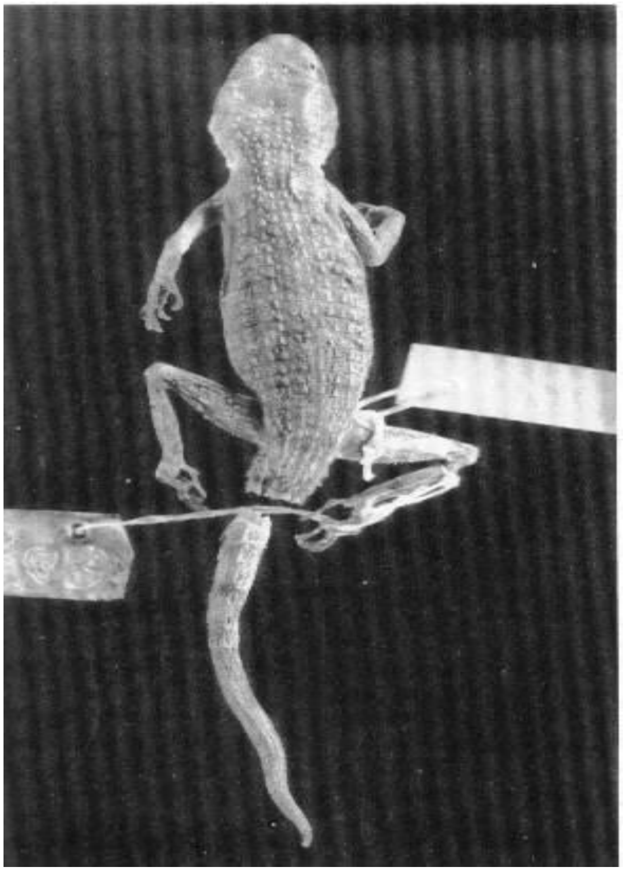


**Fig.5.11.** *Cyrtopodion kachhense ingoldbyi* Khan

Scales across midbelly 32-40.
Lateral cloacal tubercles 2-3.
Dorsolateral caudal keeled tubercles in 4 rows.
Snout-vent length 37-53 mm, tail 47-65 mm.

*Colour:*
Dorsum light gray with yellowish gray ventrum, with irregular dark brown bars, tail and limbs barred.

*Habitat*:
Khar-Rakhni-Quetta road to Punjab-Balochistan border meanders through a series of low hills. It colonizes holes and crevices among the bricks and stones under road bridges, with meager grass growing between boulders along sides of dry beds of torrents.

*Range:*
Mountain form, widely distributed in the hills along Khar-Rakhni-Quetta road, about 10 km west of Fort Munro.

### *12. Cyrtopodion kohsulaimanai* (Khan)
(**Figs. 5.12 & 5.9B**)

Interorbitals 14-17.
Dorsum with large trihedral tubercles arranged in longitudinal rows, not in contact with each other.
Rows of scales across midabdomen 27-30.
Scales along midventrum of the body from postmentals to the anterior lip of the vent 120-138.
A continuous series of 30-40 preanofemoral pores.
Snout-vent length 54-59 mm, tail 70-73 mm.

*Colour:*
Dorsum light gray, with fine light brown granulations; head and supralabials mottled with brown. Brown and white tubercles alternate with each other. Juveniles with 6-7 indistinct transverse bands from neck to the vent. Limbs and tail barred.

*Habitat*:

Essentially a ground gecko, inhabiting barren sparsely vegetated areas, in semi-sandy desert situations where it inhabits holes and fissures in the ground. However, where artificial structures in the form of buildings and bridges are available, the gecko readily invades them, inhabiting crevices and holes among bricks and stones.

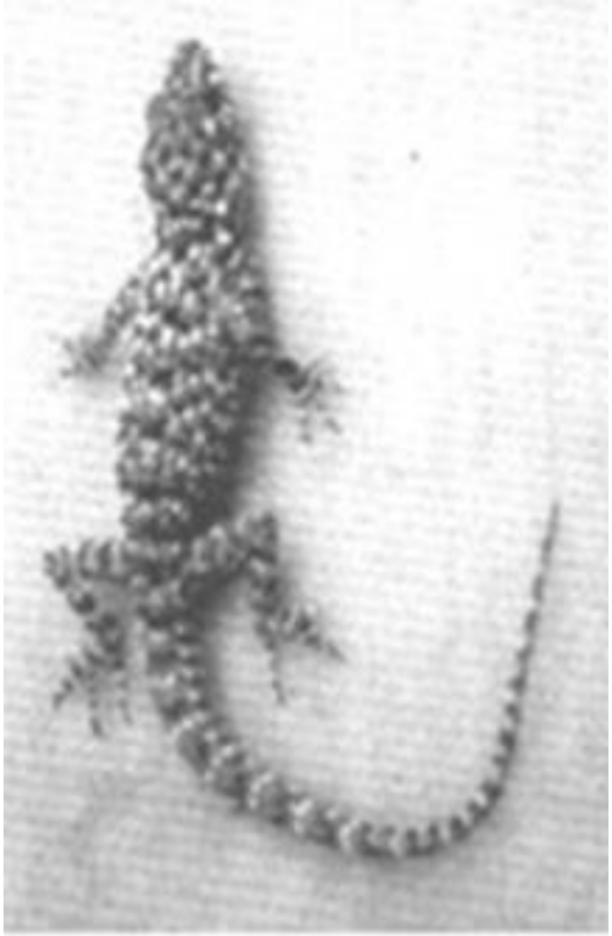


**Fig.5.12.** *Cyrtopodion kohsulaimanai* (Khan)

*Range:*

Known from two localities, Sakhisarwar and Rakhni Gorge, along Dera Ghazi Khan-Fort Munro road, in District Dera Ghazi Khan, northwestern Punjab, Pakistan.

### *13. Cyrtopodion montiumsalsorum*

(Annandale)

(**Figs. 5.13 & 5.9B**)

Dorsal large trihedral tubercles are arranged in regular longitudinal rows. They are mostly in contact with each other.
Scales across midabdomen 21-23.
Interorbitals 11-13.
Scales along midventrum of body from postmentals to the anterior of vent 112-115.
A series of 26-32 preanofemoral pores.
Snout-vent length 43-46 mm, tail 58-60 mm.

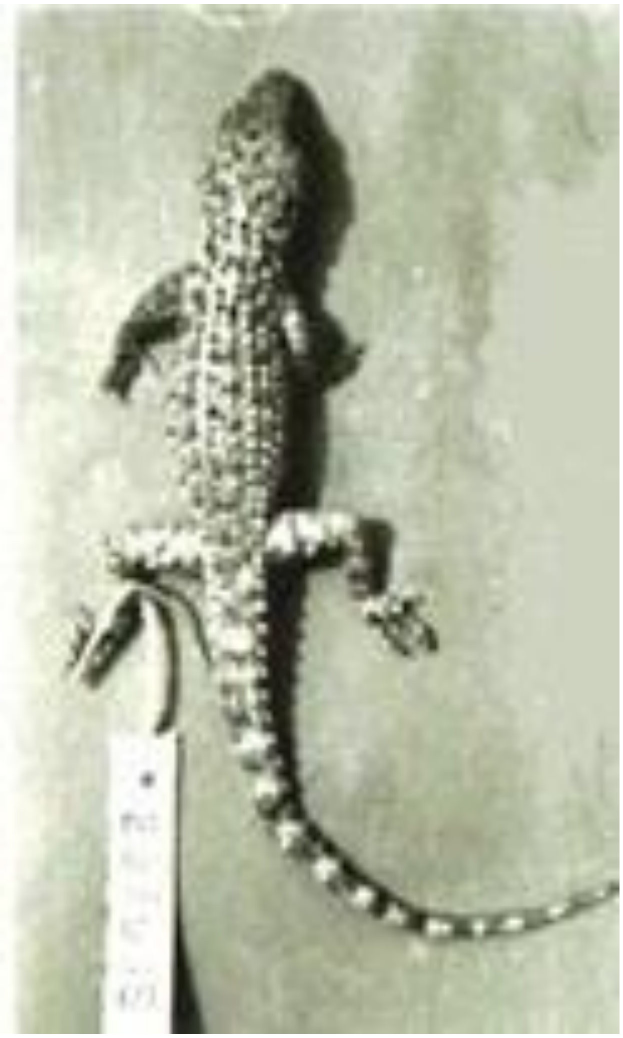


**Fig.5.13.** *Cyrtopodion montiumsalsorum* (Annandale)

*Colour:*

Dorsum light gray, dark brown and light tubercles are transversally disposed in alternate rows, giving the dorsum a variegated pattern. Tail with 13-14 crossbars. Head and labials mottled with dark brown to black. Belly light.

*Habitat*:

Primarily inhabits holes and crevices in badlands terrain along the southern Salt Range. It secondarily invades holes and crevices in the walls of buildings and rocks. It occurs sympatrically with *Cyrtopodion scabrum* and *Cyrtopodion watsoni*. In Rohtas Fort, it is sympatric with *Indogekko rohtasfortai*.

*Range:*

Collected from various localities in the southern Salt Range, Punjab, Pakistan.

### ***14. Cyrtopodion potoharensis*** Khan
(**Figs. 5.14 & 5.9B**)

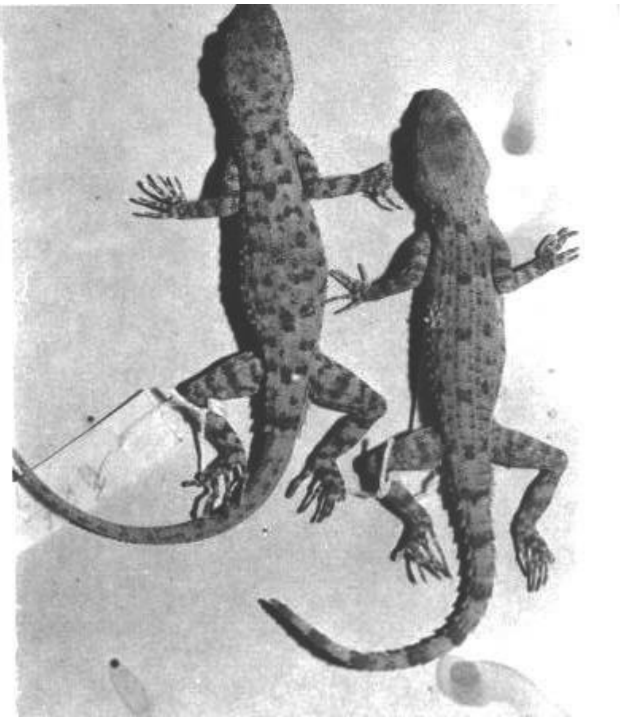


**Fig.5.14.** *Cyrtopodion potoharensis* Khan

Supralabials 10-15.
Interorbital scales 12-17.
Abdominals squarish, 25-33 across midabdomen.
Midventrals 121-145, from the postmentals to the preanal lip.
Postfemoral tubercles 5-12.
Preanal pores 6-7, arranged in an angular arch, in distinctly enlarged scales.
Caudal tubercles distinctly mucronate.
Snout-vent length 37-52 mm, tail 47-64 mm.

*Colour:*

Dorsum light bluish with 3-4 heterogeneous squarish dark spots arranged in 5-8 transverse series, from nape to the level of vent, tail with 10-12 dark bands. Limbs and digits heavily barred with black.

*Habitat*:

Collected during day from holes and crevices under roads and rail bridges, and under from under stones and slabs in District Attock, northern Punjab. Some were collected from holes and crevices along sides of mudflats through which roads run.

*Range:*

Was collected from different localities in central Potwar Plateau, Salt Range, Punjab.

### ***15. Cyrtopodion scabrum*** (Heyden)
(**Figs. 5.15 & 5.9B**)

Subcaudals in a single series of broad scales.
Scales across midabdomen not more than 25.
Snout-vent length 43-44 mm, tail 43-45 mm.

*Colour:*

Light gray to light brown dorsum, with regular brown spots, tail barred with dark brown.

*Habitat*:

A common ground gecko, it inhabits dry scrublands, and dry stony hillsides with typical sparse xerophytic vegetation. Crevices, holes, and fissures in soil with sparse grass are inhabited by this gecko. Near human habitations, it lives in crevices in boundary walls of inhabited houses, occasionally venturing inside the buildings attracted by the photophilic insects: however, it avoids confrontation with common house geckos *Hemidactylus flaviviridis* and *H. brookii*.

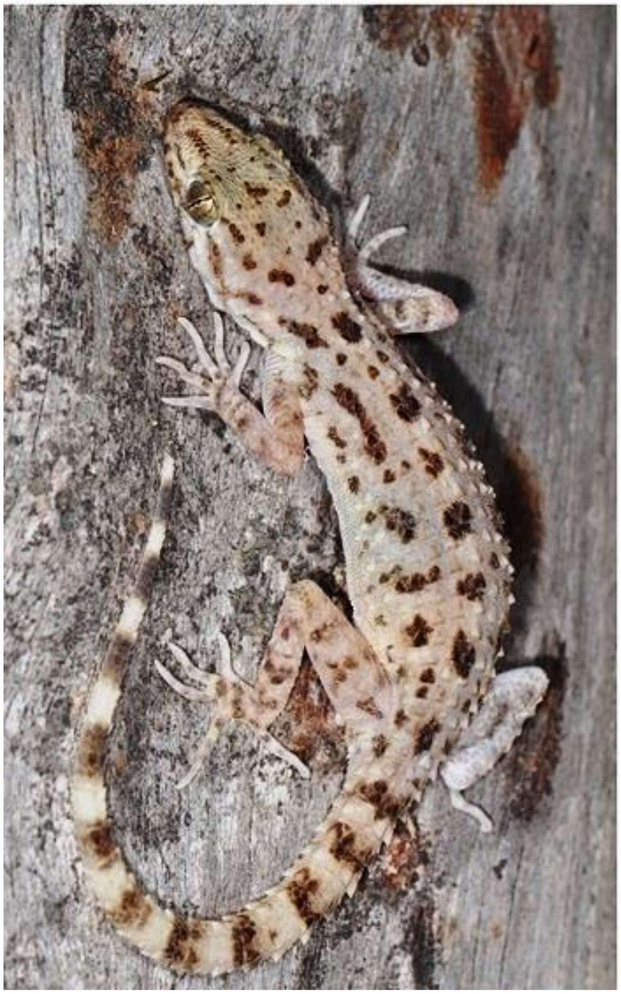


**Fig.5.15.** *Cyrtopodion scabrum* (Heyden)

*Range:*
From Egypt to Rajputana, India. In Pakistan, it has been reported from the upper and lower Indus Valleys, and along the eastern edge of the Thar Desert. It is widely distributed in Balochistan and Waziristan.

### ***16. Cyrtopodion watsoni*** **(**Murray)
(**Fig.5.16**)

More than 25 scales across midabdomen. Dorsal granular scales intermixed with larger flat keeled scales and large trihedral tubercles. Snout-vent length 50-53 mm, tail 54-57 mm.

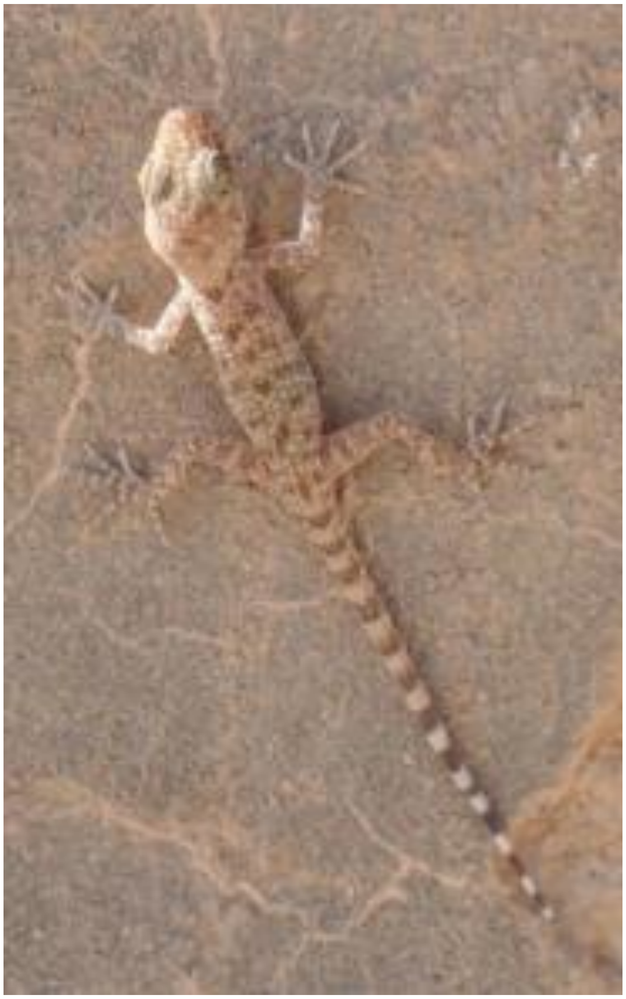


**Fig.5.16.** *Cyrtopodion watsoni* **(**Murray)

*Colour:*
Light brown dorsum, with scattered dark spots. Tail barred with dark.

*Habitat*:
Mountain gecko lives in holes and crevices in the

ground, and stone or brick walls. Occurs sympatrically with *C. scabrum*; however, avoids competition with other sympatric geckos, *Hemidactylus flaviviridis* and *H. brookii*.

*Range:*
Reported from western Salt Range, Punjab, and Quetta, Balochistan, Pakistan.

### *17. Hemidactylus brookii* Gray
(**Fig.5.17**)

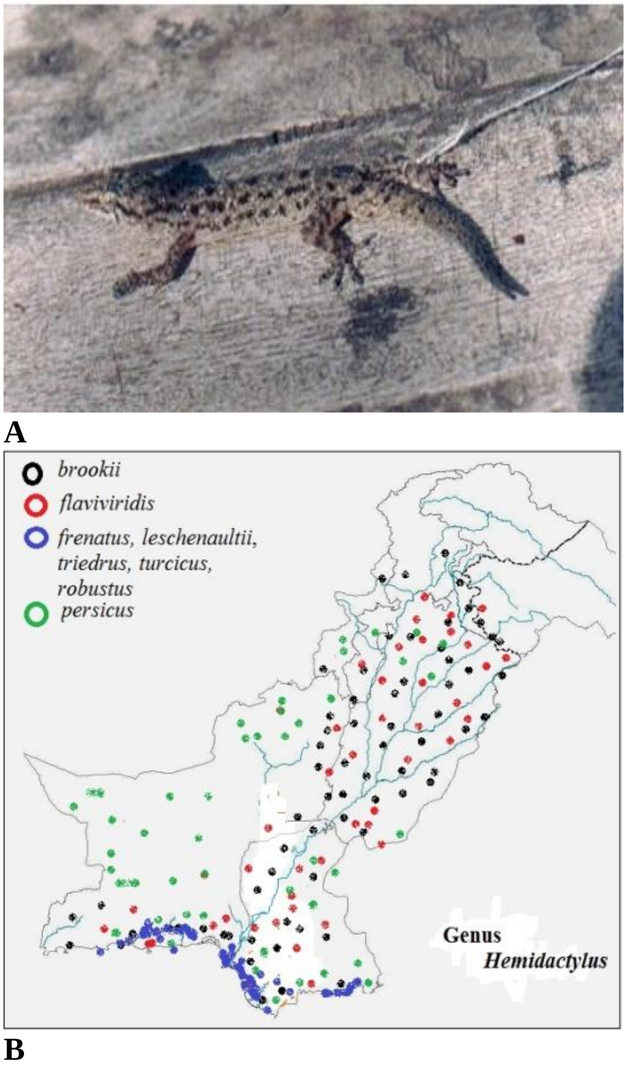


**Fig.5.17.** *Hemidactylus brookii* Gray. B shows distribution of various species of Genus *Hemidactylus* in different regions of Pakistan.

The ear opening is oval, about 1/3rd the size of the eye.
Dorsum granular, interspersed with small subtrihedral tubercles.
Supralabials 8-10, infralabials 7-9.
Lamellae under 4th toe 8-10.
Tail cylindrical, distinctly segmented, with 3 dorsolateral rows of small flat caudal tubercles, a single row of broad subcaudals.
Male with preanal and femoral pores, separated medially by 2-3 scales.

*Colour:*
Dorsum shows metachromatic changes, from dark brown to light gray, spotted with dark, a dark stripe from eye to the temple.

*Habitat*:
Most common gecko in the countryside, avoids competition with common house geckos, *Hemidactylus flaviviridis*, which inhabits the interiors of buildings. It frequents piles of chopped vegetation, logs, crops, in crevices and holes in the ground, under tree bark, around potted plants, dark uninhabited huts, leaf litter, and piles of trash. It is known to frequent tilled areas, forests, oases where it is found under leaf litter, fallen trees, and anything which can provide shelter.

*Range:*
Wide ranging in Southeast Asia, from Borneo, China, through tropical and subtropical Asia, extending through India, Pakistan, and the Middle East to northern Africa. There are reports of it from the West Indies.
In Pakistan it is a common gecko in the plains, avoiding higher northern mountains, and extends into the peripheral humid areas around deserts and oases. In Rohtas Fort it occurs sympatrically with *Cyrtopodion montiumsalsorum*, *Indogekko rohtasfortai*, *Hemidactylus flaviviridis*, and *Hemidactylus persicus*. It is widely distributed in alpine Punjab and Azad Kashmir.

### 18. *Hemidactylus flaviviridis* Ruppell
(**Figs.5.18 & 5.17B**)

Dorsum with granular scales, no distinct tubercles.
Ssupralabials 12-15, infralabials 10-14.
Lamellae under first 7-10, under fourth toe 12-15.
Tail indistinctly segmented; caudal tubercles small and conical.
Preanofemoral pores 8-15.
Snout-vent length 86-95 mm, tail 89-93 mm.

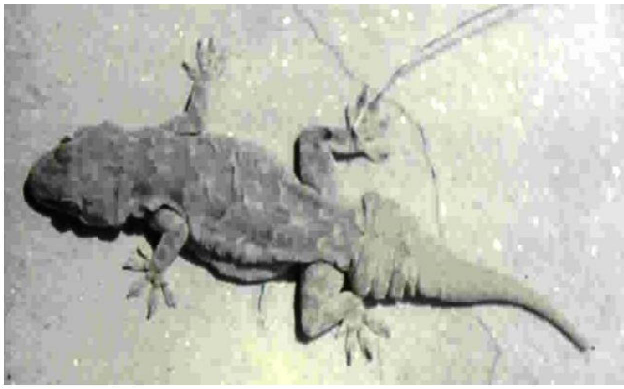


**Fig.5.18.** *Hemidactylus flaviviridis* Ruppell

*Colour:*
Dorsum shows marked metachromatic variations. Those geckos living outside the buildings, under tree bark, etc., are greenish gray, with 5 distinct dark wavy crossbars; tail is similarly barred. Dorsal pattern fades out in older geckos or in those living inside the buildings and rarely exposed to sunlight, usually they are almost uniformly grayish white; however, the ventrum is always light yellowish.

*Habitat*:
Most common and familiar house gecko throughout the plains of Punjab, Sindh, and sub-Himalayan areas. It is a strict commensal with man and strongly edificial species. It climbs into large trees, like *banyan*, *Acacia*, and *Dalbergia*, where it lives and lays its eggs in holes or under bark.

*Range:*
Wide ranging from the Red Sea to the coasts of Arabia and Iran, Pakistan, and India to Bangladesh. Human agency has played an important role in its wide Range. In Pakistan it is reported from throughout the plains below 1000 m, always in association with man.

### 19. *Hemidactylus frenatus* Schlegel
(**Figs.5.19 & 5.17B**)

First toe less than half the length of second.
Dorsal tubercles few or absent.
Supralabials 10-12, infralabials 8-10.

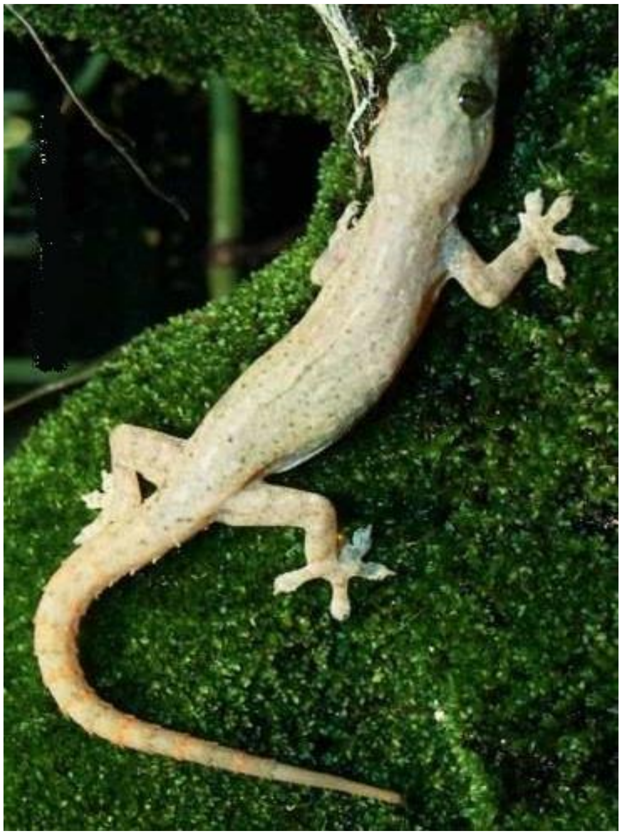


**Fig.5.19.** *Hemidactylus frenatus* Schlegel

Subdigital lamellae under first 4-5, and 9-10 under fourth toe.
Tail feebly depressed, with a series of enlarged subcaudals.

Male with a continuous series of 26-36 preanofemoral pores.
Snout-vent length 60-62 mm, tail 60-67 mm.

*Colour:*
Dorsum grayish or pinkish, sometimes much darker. With indistinct dark spots, sometimes arranged in stripes. Ventrum white, tail sometimes red.

*Habitat*:
A coastal species which, does not venture deep into the plains. Its natural habitat coincides with that of *Hemidactylus brookii.* It inhabits parks and gardens where coconut and date palm trees are common. They have been collected from among palm fronds or beneath rubbish. It rarely ventures into buildings, apparently avoiding to competition with the common yellow-belly house gecko and *Hemidactylus turcicus*.

*Range:*
A pantropic species, in Pakistan it has been collected from the lower Indus Delta.

### ***20. Hemidactylus leschenaultii*** Duméril and Bibron

(**Figs.5.20 & 5.17B**)

*Bibron:*
Round feebly keeled tubercles are scattered among granular dorsal scales which are much smaller than the interspaces, few on anterior, numerous on posterior half of the body.
Supralabials 10-12, infralabials 8-10.
Lamellae under first 6-7, and under fourth toe 9-11.
Tail strongly depressed, segmented, with a median series of enlarged subcaudals; 6 rows of dorsal pointed subcaudal tubercles.
Male with 10-17 femoral pores, medially separated by several scales.
Snout-vent length 85-86 mm; tail 85-87 mm.

*Colour:*
Dorsum gray, with dark brown crossbars or rhomboidal blotches. A dark streak from eye extends onto flanks. Dirty white belly.

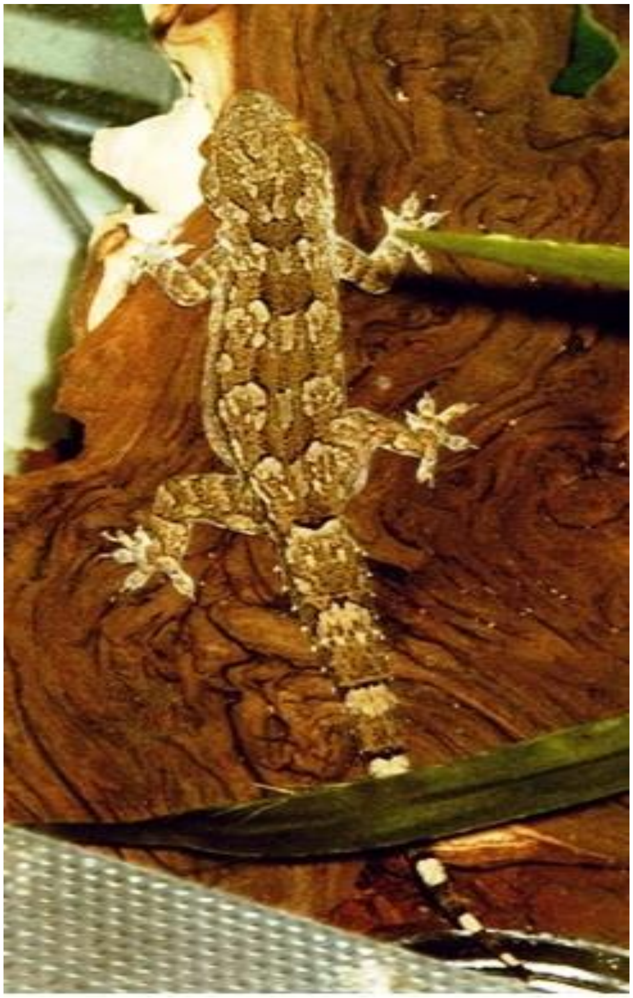


**Fig.5.20.** *Hemidactylus leschenaultii* Duméril

*Habitat*:
Arboreal, preferring large mango and banyan trees, and rarely venturing inside buildings. It is a common house gecko in Bengal. Lives under loose tree bark or between base of branches.

*Range:*
From Assam, Bangladesh, eastern and southern India, along the western coast, reaching the lower Sindh in Pakistan, where it is recorded from various localities in the lower Indus Delta and Las Bela in southern Balochistan.

### *21. Hemidactylus persicus* J. Anderson
(**Figs.5.21 & 5.17B**)

1. Supralabials 10-12, infralabials 8-10.
2. Lamellae under first 8-10, under fourth toe 12-14.
3. Preanal pores 9-13.
   Snout-vent length 68-70 mm, tail 84-86 mm.

*Colour:*
Dorsum light brownish gray, with irregularly scattered white, brown, or black keeled tubercles. Irregular light dark spots, a dark line on the side of the head, ventrum whitish.

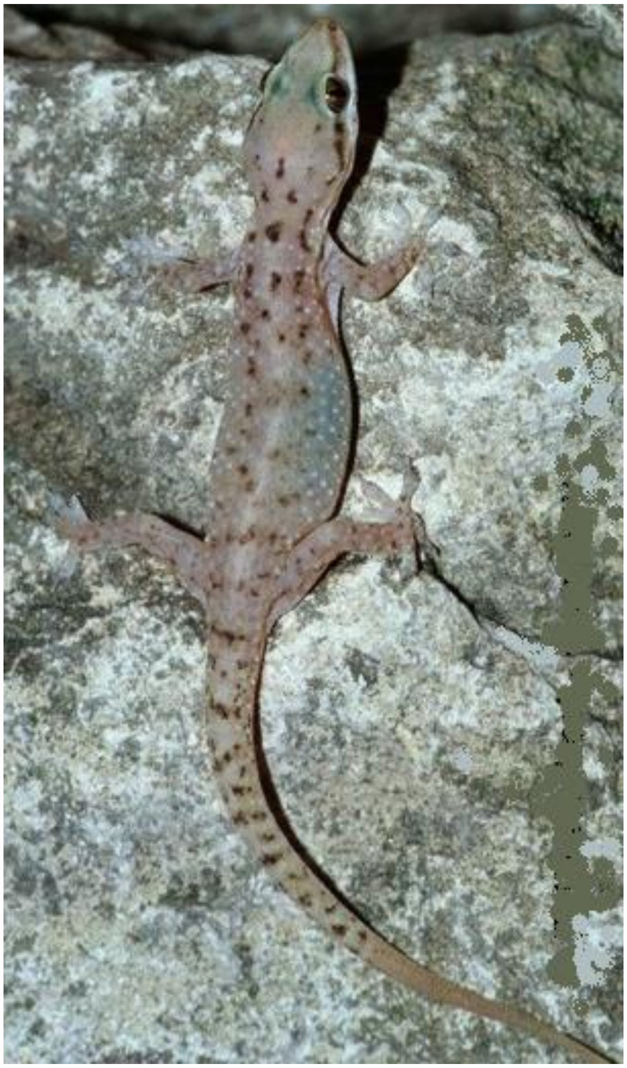


**Fig.5.21.** *Hemidactylus persicus* J. Anderson

*Habitat*:
Inhabits trees and buildings in rocky deserts and xerophytic stony terrain, on trees in oases. Invades buildings, especially old tombs.

*Range:*
From eastern Arabia, through southern Iran, Balochistan to Sindh, northward to Waziristan. Recently it has been reported from the southern Potwar Plateau, in central Punjab, Pakistan.

### *22. Hemidactylus robustus* Heyden
(**Figs.5.22 & 5.17B**)

1. Supralabials 8-11, infralabials 7-9
2. Lamellae under fourth toe 8-11
3. Preanal pores 6-7
4. Snout-vent length 68-70 mm, tail 84-86 mm.

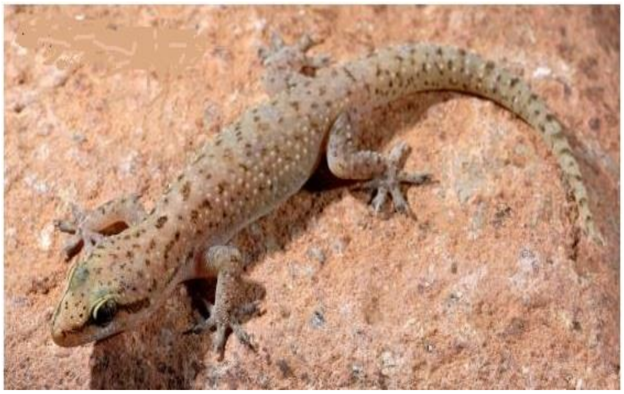


**Fig.5.22.** *Hemidactylus robustus* Heyden

*Colour:*
Basic dorsal coloration pinkish brown, translucent. A series *of dark sp*ots arranged longitudinally along mid-dorsum, often indistinct. Tail with numerous irregular, narrow, dark bands.

*Range:*
India, Pakistan, Egypt, Arabia, Abyssinia.

### *23. Hemidactylus triedrus* (Daudin)
(**Figs.5.23 & 5.17B**)

1. Dorsal large trihedral tubercles are arranged in 13-16 longitudinal rows. The

tubercles are larger than the interspaces between them.
2. Supralabials 8-10, infralabials 7-8.
3. Subdigital lamellae slightly oblique, 6-7 under first, and 7-10 under fourth toe.
4. Tail slightly depressed, with a series of transversally enlarged subcaudal scales.
5. Preanofemoral pores 6-14, in male, interrupted medially by 1-3 scales.
6. Naris separated from first supralabial.
Snout-vent length 75-77 mm, tail 76-78 mm.

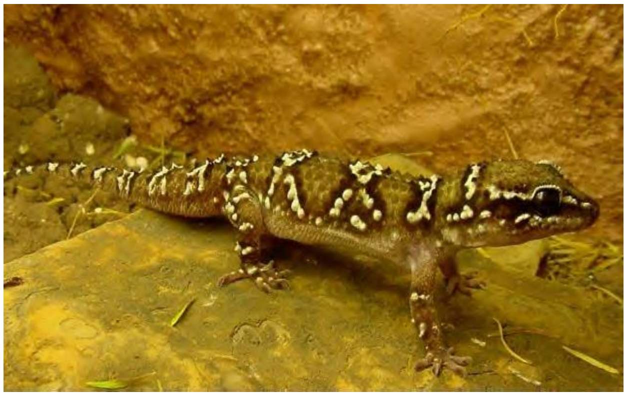


**Fig.5.23.** *Hemidactylus triedrus* **(**Daudin)

*Colour:*

Dorsum yellowish, with 3 large dark brown saddles which are narrowly edged with black; tail with dark rings. One or two yellow stripes behind eye, another on nape. Ventrum pale.

*Habitat*:

Collected from flat semiarid habitat with scrubby vegetation along coast region in Pakistan.

*Range:*

From Sri Lanka and peninsular India to Karachi, in Pakistan, where it is known from the coastal localities in the lower Indus Delta.

### ***24. Hemidactylus turcicus*** (Linnaeus)

(**Figs.5.24 & 5.17B**)

1. Naris bordered by first supralabial.
2. Supralabials 7-10 and infralabials 6-9.
3. Dorsal tubercles large, subtrihedral arranged in 14-16 fairly regular longitudinal rows.
4. Subdigital lamellae under inner 7-8 and under fourth toe 8-11.
5. Tail subcylindrical, covered above with irregular, somewhat pointed scales and a series of 6-8 large pointed tubercles, median subcaudals are transversally enlarged.
6. Male has 4-10 (rarely 2) preanal pores.
Snout-vent length 58-61 mm, tail 59-65 mm.

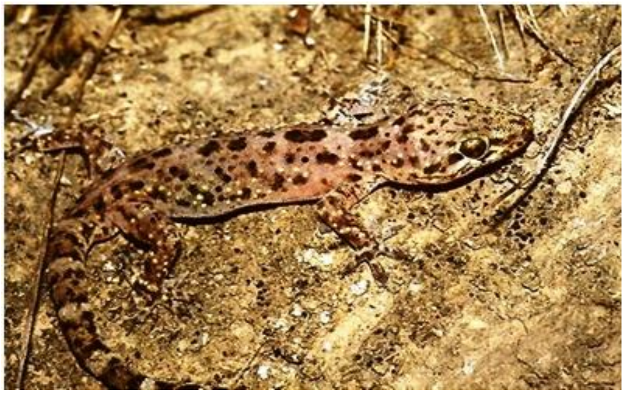


**Fig.5.24.** *Hemidactylus turcicus* (Linnaeus)

*Colour:*

Dorsum light brown or grayish, spotted with black, sometimes spots arranged in transverse series. A dark streak on sides of the head usually present. Ventrum dirty white.

*Habitat*:

A coastal gecko, picked especially from the base of palm fronds, from under rocks, piles of stones, and bricks and rubbish.

*Range:*

Extensive range from the West Indies, eastern Mexico, southern United States, northern Africa, circum-Mediterranean countries and islands, the Middle East, Iran, and Afghanistan. In Pakistan it has been reported from various localities along coastal Sindh. In Karachi city this gecko has been found to occur in houses side by side with *H. flaviviridis*.

## *25. Indogekko fortmunroi* (Khan)

(**Fig.5.25**)

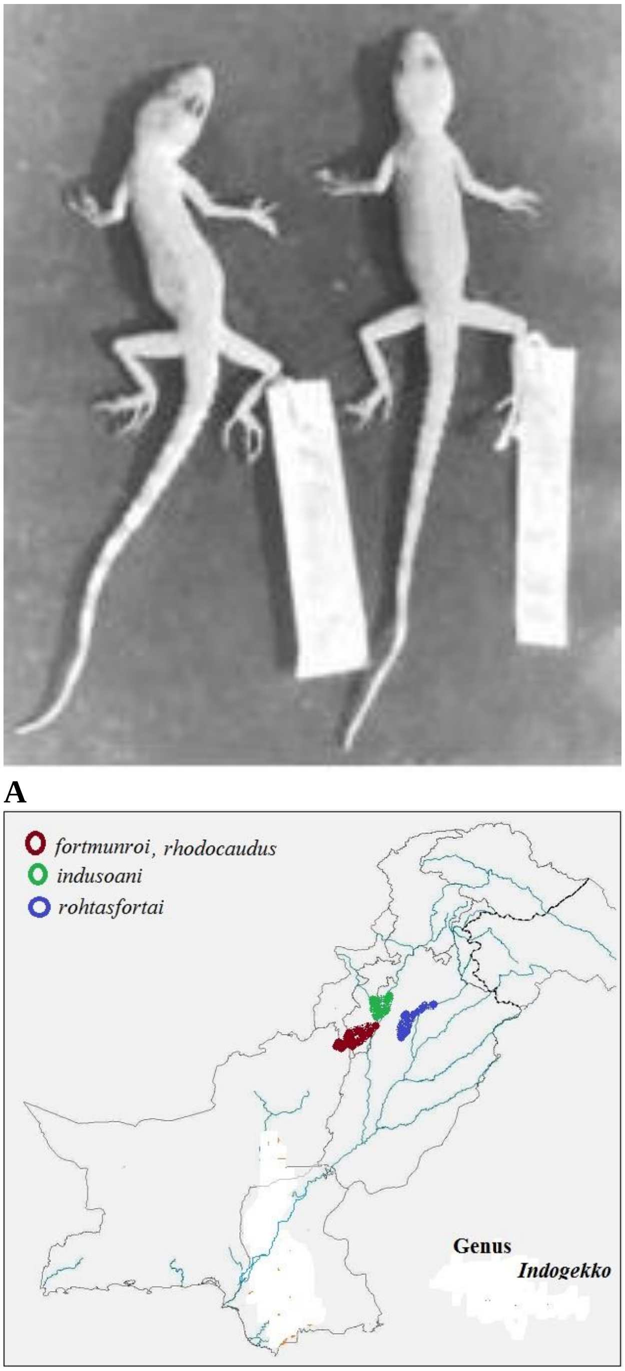


**Fig.5.25.** *Indogekko fortmunroi* (Khan). B shows distribution of various species of Genus *Indogekko* in different regions of Pakistan.

1. Dorsal granular scales tubercular, juxtaposed, interspersed with 12 rows of flat, keelless, round larger tubercles.
2. Body much depressed, habitus weak.
3. Tail longer than body, segmented, with 3 rows of trihedral caudal tubercles on sides.
4. Subcaudals in a transversally enlarged median series.
   Snout-vent length 48-50 mm, tail 65-68 mm.

*Colour:*

Dorsum light brown, with a series of 14 median transverse dark bands, as broad as the interspaces. Head light brown with dark mottling. A dark stripe from snout through eye joins first band on nape. Dorsal tubercles of light and dark form a mosaic dorsal pattern. Limbs mottled with dark. The geckos found in buildings are light gray with darker spots, and no dark mottling on head and limbs.

*Habitat*:

Inhabits crevices and holes among sandstone slabs, around Fort Munro. It readily invades buildings where it gathers around lights at night, to feed on photophilic insects.

*Taxonomic notes:*

Baig's (1998) taxon *Indogekko (Tenuidactylus) rhodocaudus*, from Tanishpa village, District Kila Saifullah, Balochistan. Is a sub species of *Indogekko rohtasfortai*, diffes in minor pholidosic variations and red tail tip (lost on preservation):

Pholidosic counts are:

1. Dorsum with 12-14 longitudinal rows of smooth or feebly keeled, enlarged tubercles.
2. Midabdominal scales 16-18.
3. Preanofemoral pores 23 in male; 5-9 preanal pores in female.
4 Dorsolateral rows of enlarged spinose scales on tail 2.

5. Midventral scales between mental and vent 92-106
   Snout-vent length 59.0 mm, tail length 74.0 mm.

*Range:*
Fort Munro and Khar village, in the northwestern Dera Ghazi Khan District, Punjab, Pakistan. Extended to northern Balochistan.

### ***26. Indogekko indusoani*** (Khan)
(**Figs.5.26 & 5.25B**)

1. Interorbitals 13-15.
2. Body depressed, tail longer than body.
3. Dorsal tubercles flat, in 11 irregular longitudinal rows.
4. Scale rows across midabdomen 23-25.
5. Preanal pores 4-5.
   Snout-vent length 50-53 mm, tail 75-78 mm.

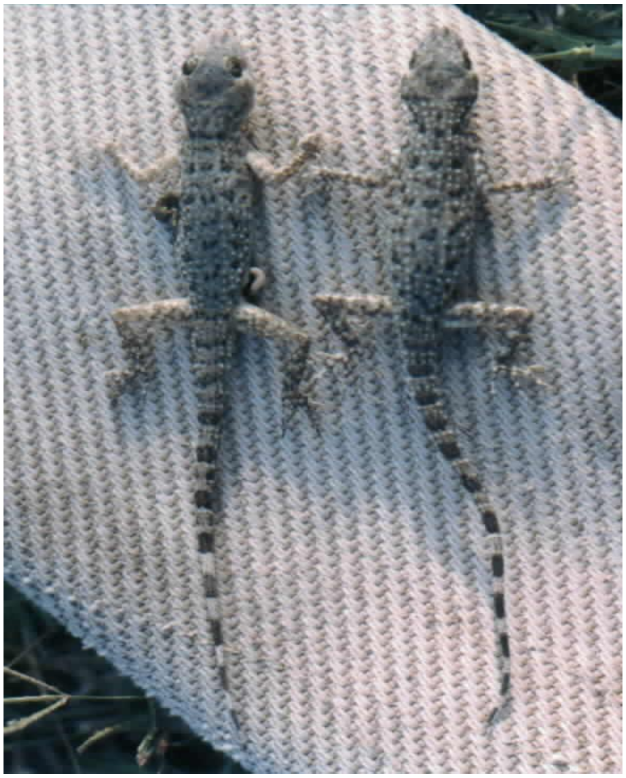


**Fig.5.26.** *Indogekko indusoani* (Khan)

*Colour:*
Dorsum light to dark gray, with dark mottling on snout and labials. A dark streak behind eyes connected behind nape with that of other side. Seven transverse dark bands from neck to the level of vent, each composed of a series of 3 oval spots. Limbs mottled with dark. Ventrum white.

*Habitat*:
Inhabits crevices among sandstone rocks along the bank of the River Indus, close to the site where Soan River opens in the Indus as it enters Punjab Province in District Mianwali. *I. rhodocaudus* is reported from similar habitat in northern Balochistan.

*Range:*
From northern Balochistan to the northwestern border of the Salt Range, Punjab, Pakistan.

### ***27. Indogekko rohtasfortai*** **(**Khan and Tasnim)
(**Figs.5.27 & 5.25B**)

1. Middorsum with flat, round, slightly keeled tubercles; lateral sides with subtrihedral to conical tubercles, in 12-14 longitudinal rows.
2. Scale rows across midabdomen 24-33.
3. Males with a continuous series of 18-27 preanofemoral pores.
4. Midventral scales 103-135, from postmentals to the anterior lip of vent.
   Snout-vent length 48-51 mm, tail 63-65 mm.

*Range:*
Widely distributed species in alpine Punjab and southeastern Azad Kashmir. It extends into the hilly terrain of the Potwar Plateau, especially from Jhelum to Islamabad west ward into northern Balochistan.

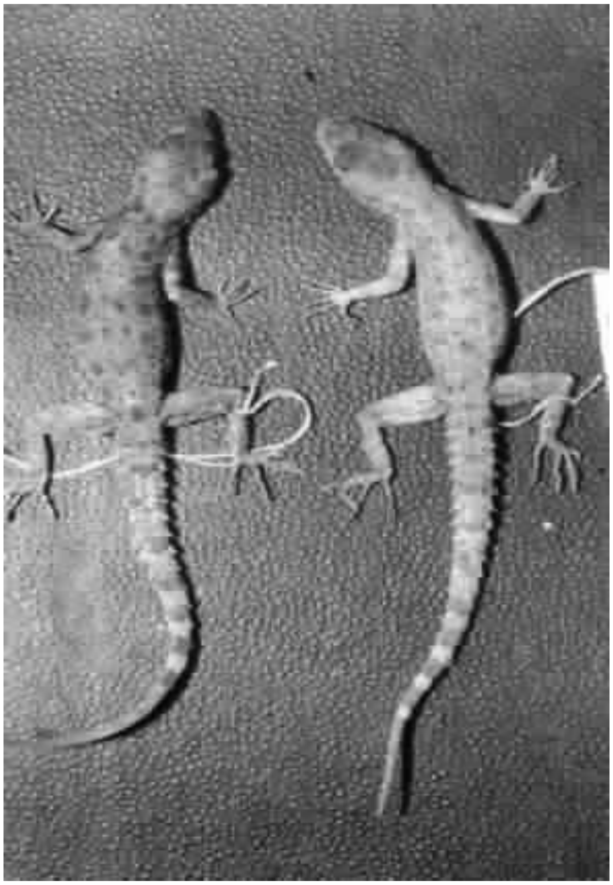
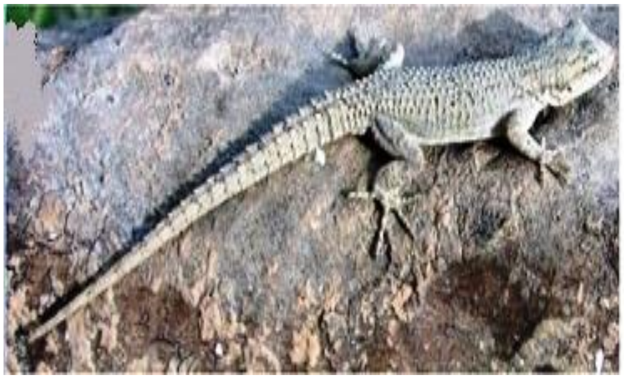


**Fig.5.27.** *Indogekko rohtasfortai* (Khan and Tasnim)

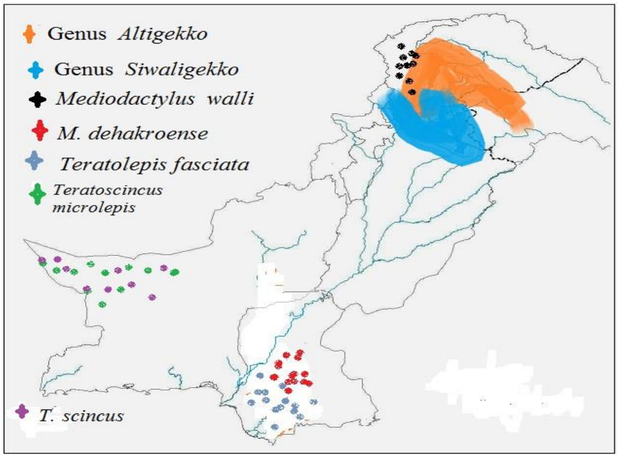
### *28. Mediodactylus dhakrensis* (Mansoor) (**Fig.5.28**)

*Habitat*:
An arboreal species**.**

*Range:*
Known from Sindh



**A**



**B**

**Fig.5.28.** *Mediodactylus dhakrensis* (Mansoor). B shows distribution of species of Genus *Mediodactylus* in different parts of Pakistan.

### *29. Mediodactylus walli* (Ingoldby) (**Figs.5.29 & 5.28B**)

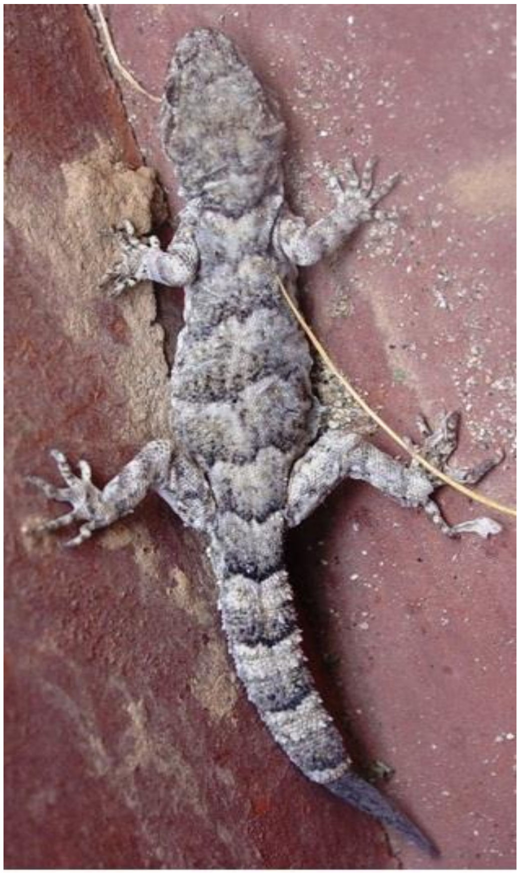


**Fig.5.29.** *Mediodactylus walli* (Ingoldby)

1. Body moderately depressed.
2. Dorsal tubercles are oval, keel-less scattered among granular scales.
3. Subcaudals are broader than long, in a single median series.
4. Caudal tubercles are given out from the middle of the caudal segments.
5. Preanal pores 4-5 in male.
   Snout-vent length 54-55 mm, 78-79 mm.

*Colour:*
Dorsum light gray to dark, with 9 wavy crossbars, slightly broader than the interspaces. A dark stripe from eye, joining the band on nape. Limbs barred, tail with alternating light and dark bars.

*Habitat*:
The gecko has been picked from the walls of inhabited houses.

*Range:*
Known from Drosh Fort, Karakal village in Bumhoet Valley, and Ghariet village, Chitral, and northwest Potohar, all in Khyber Pakhtunkhwa, Pakistan.

### ***30. Ptyodactylus homolepis*** Blanford

(**Fig.5.30**)

1. Digits terminate into a subtriangular expansion, which is as broad as the diameter of eye; claws are centrally located.
2. Supralabials 13-15, infralabials 12-15.
3. Mental and submental scales indistinct.
4. Rostral does not border naris.
5. Head and body with granular scales, no tubercles.
6. Tail subcylindrical, with smaller dorsal and larger ventral scales.
   Snout-vent length 100-108 mm, tail 85-89 mm.

*Colour:*
Dorsum light brown to gray, with broad transverse lighter wavy bands. Ventrum white.

*Habitat*:
Primarily a mountain species in northeastern Kirthar Range.

*Range:*
There is no subsequent report of this gecko from Pakistan. It is yet known only from its type locality, in the Kirthar Range.

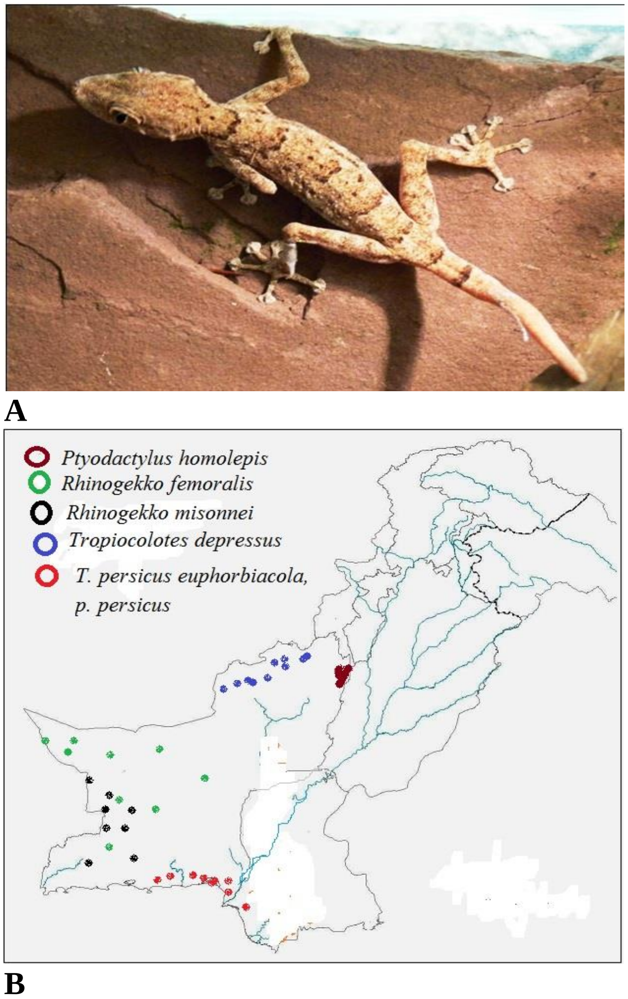


**Fig.5.30.** *Ptyodactylus homolepis* Blanford. B shows distribution of the species in different parts of Pakistan.

### *31. Rhinogekko femoralis* Smith
**(Figs.5.31 & 5.30B)**

1. Head about twice as long as broad.
2. Diameter of ear opening is half that of the eye.
3. Mental longer than adjacent labials, a pair of distinct postmentals, which are in contact with each other.
4. Gulars small, flat granules.
5. Naris on a caruncle formed by rostral and first supralabial.
6. Ventrals in 17-21 rows at midbody.
7. Males with 6 (rarely 5) preanal pores.
8. A series of 9-12 enlarged subfemoral scales.
9. Tail longer than body, sharp-tipped.

Snout-vent length 60-62 mm, tail 60-64 mm.

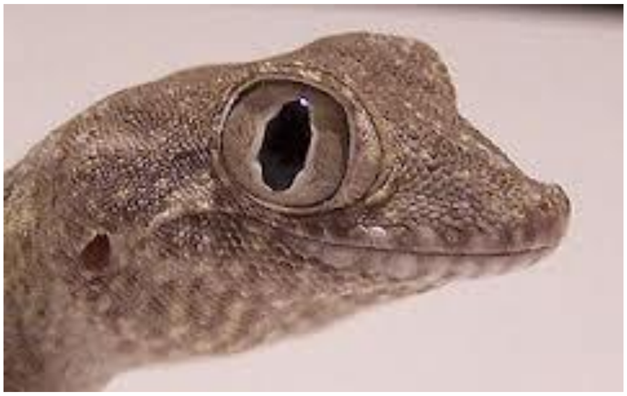


**Fig.5.31.** *Rhinogekko femoralis* Smith

*Colour:*
Light yellow gray, with 5 dark cross bars on body and 8-10 on tail.

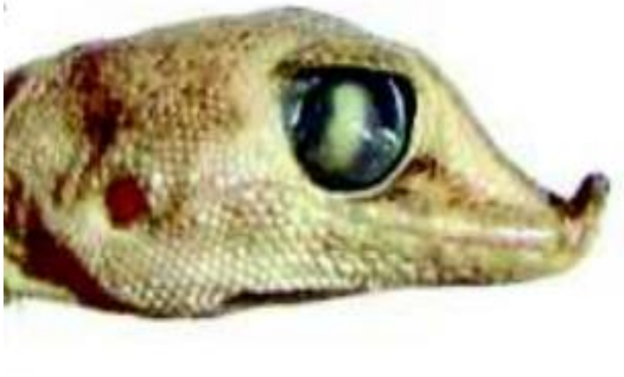
*Habitat*:
Gecko collected from sandy deserts with rocky outcrops and scarce vegetation of bushes. It is terrestrial and rarely climbs vertical surfaces. When encountered, it poises for defense by flattening its body, elevating its tail, and twitching it from side to side.

*Range:*
It has been reported from Kharan and Chagai Deserts, close to the rocky outcrops.

### *32. Rhinogekko misonnei* de Witte
**(Figs.5.32 & 5.30B)**

1. Nasal scales strongly elevated carrying naris at a tube on the snout.
2. Scales across midbelly 26-28.
3. A row of 9-12 enlarged scales on thigh ventrum.
4. Four to eight very poorly developed preanal pores.
5. Tail slightly longer than the body.

Snout-vent length 56-61 mm, tail length 58-73 mm.



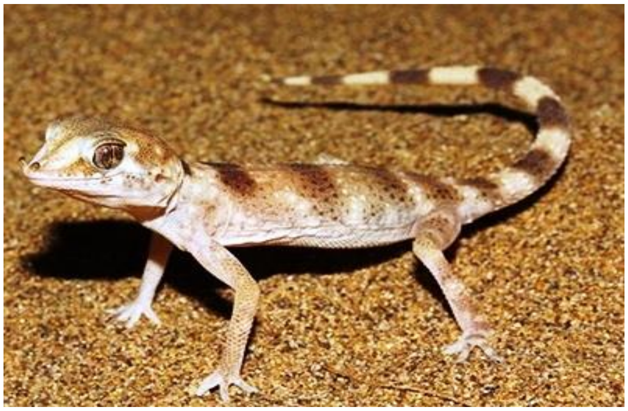


**Fig.5.32.** *Rhinogekko misonnei* de Witte

*Colour:*
Coffee gray dorsum, 5 wide dark transverse bands on body, 7 on tail, limbs similarly barred. Ventrum whitish.

*Habitat*:
The lizard is reported from the gravel deserts with scanty vegetation.

*Range:*
Known from Dasht-i-Lut along the Iran-Pakistan border.

### *33. Siwaligekko battalensis* (M. S. Khan)
**(Figs.5.33 & 5.28B)**

1. Dorsum with obtusely keeled flat tubercles scattered among granular scales.
2. Scales across midabdomen 50-52
3. Scales along midventrum of body from postmentals to anterior of the vent 199-205.
4. Preanal pores 9-10 arranged in an arch, no femoral pores.
5. Tail round, without marked segmentation.
6. Subcaudals small in several rows.
   Snout-vent length 60-64 mm, tail 63-64 mm.

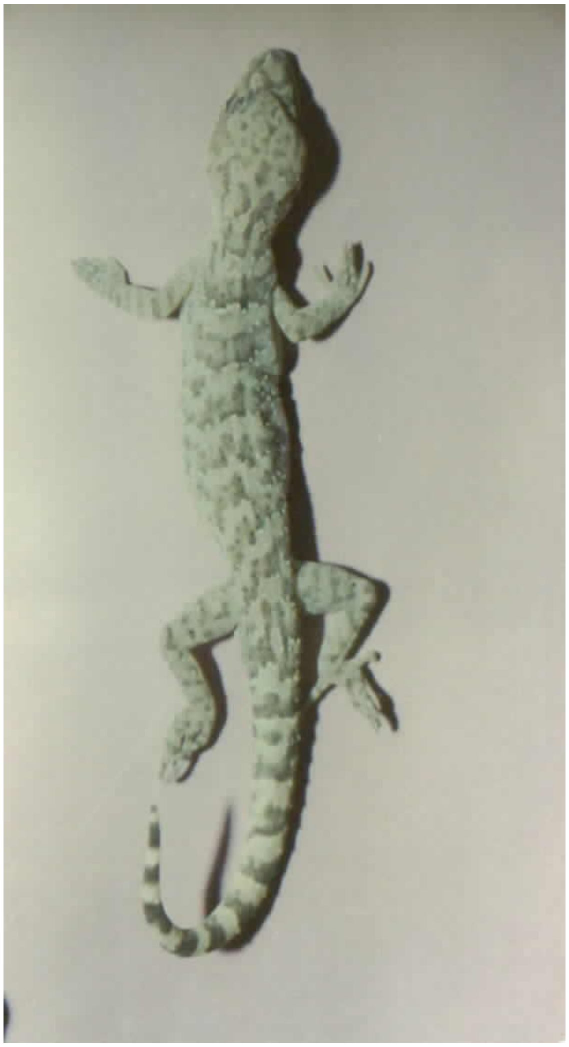


**Fig.5.33.** *Siwaligekko battalensis* (M. S. Khan)

*Colour:*
Dorsum light brown, with 7 dark brown transverse bands, much narrower than the interspaces, with irregular borders touching each other so to form a distinct dark reticulum on dorsum of the body. A vivid dark stripe from snout through loreal and eye joins first transverse band on the nape. Frontal with a dark U-shaped mark, several small transverse stripes on head. Limbs with dark reticulation. Tail with 11 dark rings, extending onto the tail ventrum.

*Habitat*:
An alpine gecko, living in crevices among rocks, close to the roots of vegetation. It invades buildings, living in holes and crevices among brick and stone walls. Its movements are deliberate, invades surrounding vegetation just after sunset, and returning to its retreats before dawn.

*Range:*
The reticulate gecko is known only from its type locality, Batgram, District Manshera, Khyber Pakhtunkhwa, Pakistan.

### *34. Siwaligekko dattanensis* (M. S. Khan)
**(Figs.5.34 & 5.28B)**

1. A single pair of postmentals.
2. Dorsal tubercles round, keel-less, arranged in longitudinal rows.
3. Male with 8-9 preanal pores.
4. Tail unsegmented, round, with small flattish caudal tubercles, small subcaudals.
   Snout-vent length 60-62 mm, tail 56-57 mm.

*Colour:*
Darkish gray dorsum, with 10 dark brown wavy crossbars from nape to the vent, broader than the interspaces; bars tend to break into spots on flanks. Tail barred, bars extending onto tail ventrum. Belly dirty white.

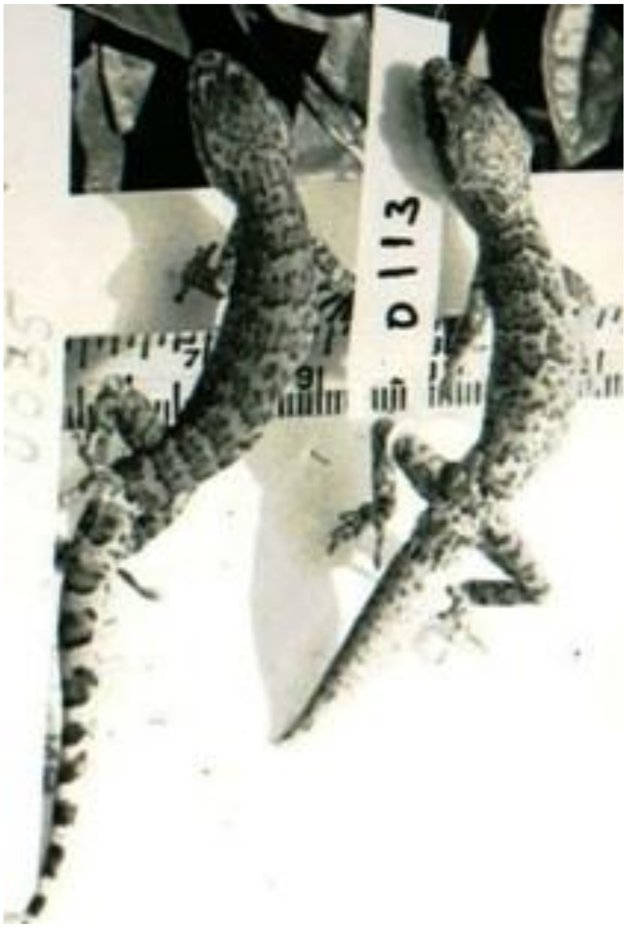


**Fig.5.34.** *Siwaligekko dattanensis* (M. S. Khan)

*Habitat*:
Collected from rocky alpine terrain, where it lives in crevices among rocks and among roots of pine trees. It feeds on soft bodied insects and their larvae.

*Range:*
The barred gecko is widely distributed in alpine Punjab and eastern Northwestern Frontier Province, Pakistan.

### ***35. Siwaligekko mintoni*** (Golubev and Szczerbak)
(**Figs.5.35 & 5.28B**)

1 Dorsal pattern of narrow wavy dark brown crossbars, much narrower than interspaces. Bands are broken into round spots on flanks.
2. Nasal scales 3.
Snout-vent length 38-40 mm, tail 35-37 mm.

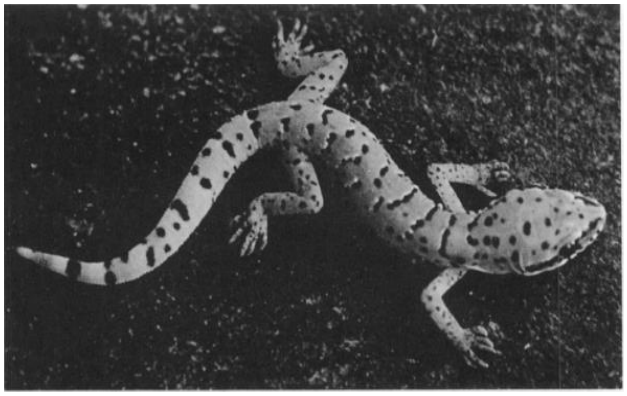


**Fig.5.35.** *Siwaligekko mintoni* (Golubev and Szczerbak)

*Colour:*
Dorsum amber, shading to lemon on tail. A series of 8 irregular, wavy, broken, dark brown to black crossbars on body, mostly with posterior white edge. Sides of body, head, tail, and limbs with scattered dark brown dots. Ventrum pale yellow. Labials barred.

*Habitat*:
Collected from stony areas in wooded hilly country at about 100 m of elevation. The gecko is sluggish with deliberate movements.

*Range:*
Known by its type specimen, which was collected from Udigram, Swat, Khyber Pakhtunkhwa, Pakistan.

### ***36. Teratolepis fasciata*** (Blyth)
(**Figs.5.36 & 5.28B**)

1 Digits are moderately dilated, with a terminal slender clawed phalanx arising

angularly from the middle of the terminal expanded part of the digit.
2. A series of transverse subdigital lamellae, anterior of which are slightly notched.
3. Body dorsum with large pointed imbricate scales, much larger than the ventrals.
4. Tail swollen, its posterior one-fourth tapers abruptly behind to a point, dorsally covered with large imbricate scales.
5. Subdigital lamellae 7 under first, 8-9 under fourth toe.
6. Male with 5-6 preanal pores.
Snout-vent length 45-46 mm, tail 32-33 mm.

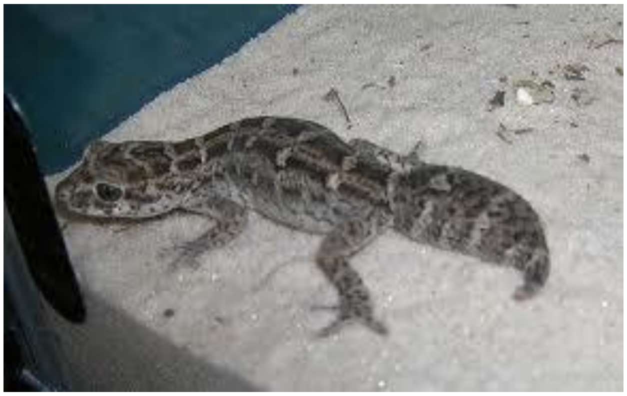


**Fig.5.36.** *Teratolepis fasciata* (Blyth)

*Colour:*
Light grayish brown dorsum, with 5 longitudinal dark brown stripes, crossed by 6 rows of large whitish spots. A pair of whitish transverse bands on the occiput. Tail brownish with whitish crossbars.

*Habitat*:
The most striking feature of this gecko is its large thick flat tail, covered with large leaf-like scales. The tail serves as storehouse for the surplus fat, and is used as a shield and as an assault organ.

The gecko inhabits flat terrain with an average elevation of 10 m above sea level. The soil is generally loose gray silt with desert scrub vegetation, dominant plants are *Salsola* and grasses.

*Range:*
The gecko is recorded from different localities in the lower Indus Delta in Pakistan.

### *37. Teratoscincus microlepis* Nikolsky
(**Figs.5.37 5.28B**)

1. Middorsal large cycloid scales do not extend beyond shoulder.
2. Scales round midbody 100.
3. Head with granular scales.
4. Postmentals absent.
5. Tail with a median dorsal series of large flat scales.
6. A prominent upper movable eyelid.
Snout-vent length 71-73 mm, tail 47-51 mm.

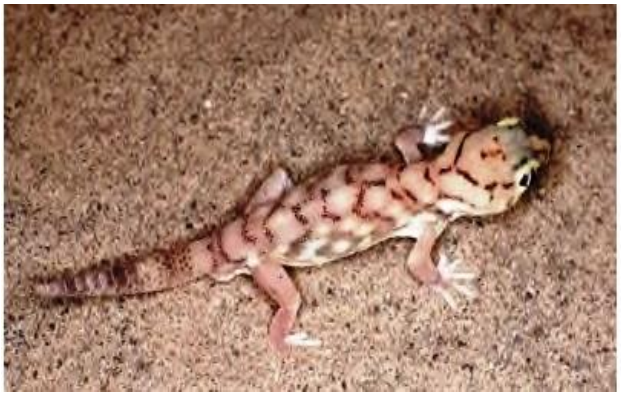


**Fig.5.37.** *Teratoscincus microlepis* Nikolsky

*Colour:*
Dorsum cream, with dark brown, oblique or V-shaped bars on back, indistinct in older specimen. A dark U-shaped mark on the back of head. Tail barred with dark.

*Habitat*:
Xerophytic shrubs in loose sandy soil. It movements are slow and deliberate, however, to escape capture it sprints and takes to shelter. Captured individuals lunge and strike with the tail, which is kept twitching sideways. The

geckos feed on soft-bodied arthropods and larvae of certain sand beetles. When moving on sand the tail leaves a streak between the tracks.

*Range:*

The gecko has been collected from Nushki and Kharan in Balochistan; it extends westward to Dasht-i-Lut, near Kirman, Iran.

### *38. Teratoscincus scincus* (Schlegel)

(**Fig.5.38**)

1. A median dorsal series of large cycloid scales extends to the back of head.
2. No postmental scales.
3. Scales round the midbody 28-34.
4. Head with granular scales.
5. Tail with a median dorsal series of large cycloid scales.
6. Upper eyelid moveable.
   Snout-vent length 116-120 mm, tail 89-92 mm.

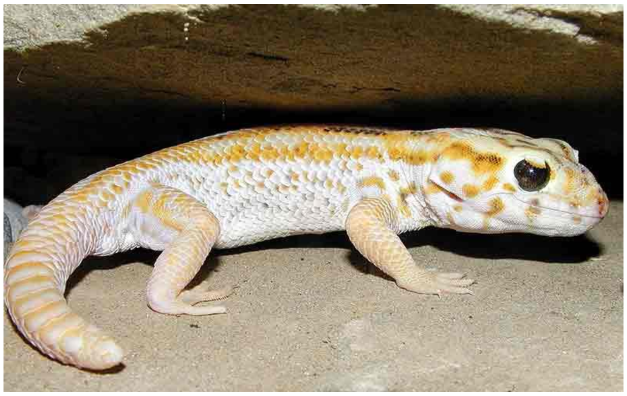


**Fig.5.38.** *Teratoscincus scincus* (Schlegel)

*Colour:*

Dorsum cream, with faint dark brown transverse bars or with 4 reddish brown longitudinal stripes. Head with brown markings, lips barred. Sides and ventrum pinkish to white.

*Habitat*:

Restricted to fine windblown tracts of sand, it is nocturnal, becoming active just after sunset. It walks deliberately with the legs holding the body high, tail trailing behind, and leaving distinct spoor. When followed it sprints for a short distance, stopping occasionally to observe the pursuer. When cornered it turns around to attack with a snarl, twitching and swaying its tail, the scales of which produce faint rustling sound. It often lashes the intruder with its tail. The gecko, if cornered, bites powerfully. Its burrows are 20-28 cm deep and the entrances are plugged by sand.

*Range:*

This gecko has a wide range in the west from the Caspian Sea to Tajikistan, and extends into western Balochistan, Pakistan.

### *39. Tropiocolotes depressus*

Minton & J. A. Anderson

(**Figs.5.39 & 5.30B**)

1. Postmentals absent or a small pair may be present, not in contact with each other.
2. No enlarged internasal and postnasal scales, four scales border the naris.
3. Lamellae under 4th toe 17-18.
4. A pair of preanal pores in large preanal scales.
   Snout-vent length 31-34 mm, tail 30-31 mm.

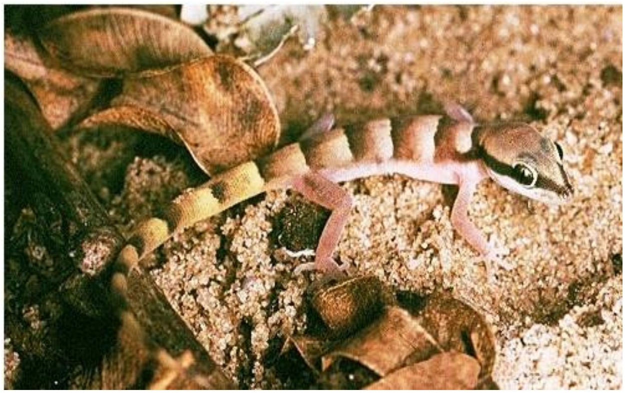


**Fig.5.39.** *Tropiocolotes depressus* Minton & J.A. Anderson

*Colour:*

Dorsum saffron yellow, with a transverse dark band on neck, 3-5 on body, narrower than interspaces, 6 on tail. Ventrum pinkish white. A dark stripe from snout through eye onto neck.

*Habitat*:

The mountain dwarf gecko has been collected from hillsides with sparse vegetation between 1800 and 2000 m. It inhabits crevices among rocks. The gecko is agile, it running on rocks and stones with agility, feeding on soft-bodied arthropods. Its eggs have been found under stones and rocky slabs in humid places (Minton and Anderson, 1965).

*Range:*

The gecko is recorded from hilly tracts north of Quetta, Balochistan.

### ***40. Tropiocolotes persicus*** *(*Nikolsky)

(**Figs.5.40 & 5.30B**)

1. Supralabials 8-10.
2. Two pairs of postmental scales, usually first pair in contact with each other.
3. Interorbital scales 19.
   Total length 25.3 mm, tail 17-18 mm.

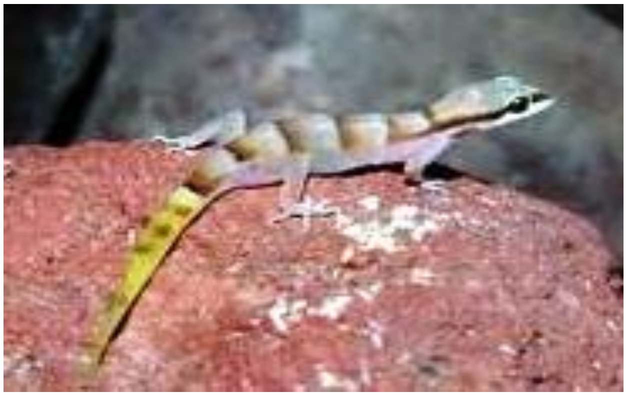


**Fig.5.40.** *Tropiocolotes persicus (*Nikolsky)

*Colour:*

In alcohol dorsum light yellowish. A wide dark brown stripe from nostril through eye extends along dorsolateral sides of the body; 5-7 similar crossbars between neck and base of the tail; 6-10 bands across tail dorsum, head and limbs without pattern, ventrum white.

*Range:*

Extends from southwestern Iran to southeastern Sindh, Pakistan.

### ***41. Tropiocolotes persicus euphorbiacola***

Minton et al.

(**Figs.5.41 & 5.30B**)

1. Dorsal bands, on body, as wide as or narrower than the interspaces.
2. Postmentals 1-3, first in contact with each other.
3. Regenerated tail always yellow.
4. Subdigital lamellae under fourth toe 14.
   Snout-vent length 28-33 mm, tail 32-34 mm.

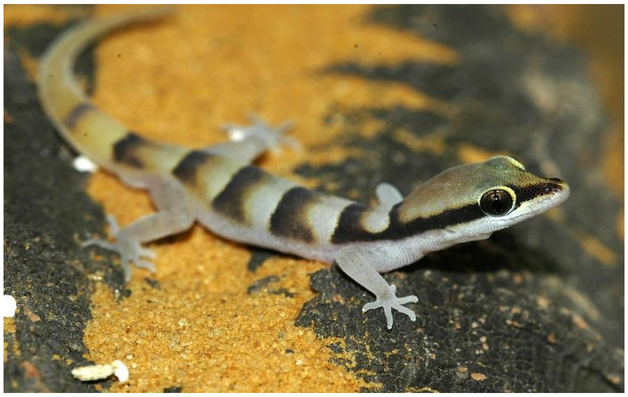


**Fig.5.41.** *Tropiocolotes persicus euphorbiacola* Minton et al.

*Colour:*

Body dorsum pale yellow or amber. Five dark brown transverse bands on body, 8 on tail. A dark stripe from snout to the eye joins first dorsal bar. Ventrum pinkish.

*Habitat*:

It is a widely distributed small gecko in Las

Bela and found to be plentiful in the vicinity of drying dead plants of *Euphorbia caudicifolia* from mid-November to February. The gecko appears to have great affinity with the plant, perhaps it is well protected by its strong thorns. However, in rocky terrain below 200 m, the gecko invades rocks. In warm moist weather the geckos are very active on rocks, slipping from stone to stone with agility, hiding in crevices and holes.

*Range:*
This gecko has been reported from Las Bela, Balochistan and lower Sindh, Pakistan.

# APPENDIX
## Scientific, common English and Urdu names

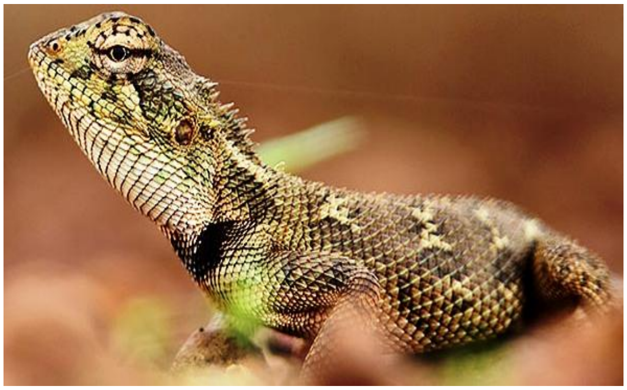
| Scientific names | Common English | Roman | Urdu |
|---|---|---|---|
| **Eublepharidae** | Fat-tail geckos | *Moti dum Chapkalian* | موٹی دم چھپکلیاں |
| *Eublepharis macularius* (Blyth, 1854) | Fat-tail Spotted Gecko | *Khun khun, Moti-dumn Kirrli* | کُھن کُھن |
| **Gekkonidae** | Geckos | *Chap kalian* | چُھپ کلیاں |
| *Crossobamon lumsdenii* (Boulenger, 1887) | Comb-toed sand gecko | *Kanghi-ungusht chapkali* | ریکستانی کنگی اُنگشت چھپکلی |
| *Crossobamon maynardi* (Smith, 1933) | Striped Sand Gecko | *Dhari-dar chapkali* | دھاری دار کنگھی اُنگشت |
| *Crossobamon orientalis* (Blanford, 1876) | Yellow-tail Sand Gecko | *Pelee-dum chapkali* | زرد دم چھپکلی |
| *Cyrtopodion agamuroides* (Nikolski, 1900) | Makran Spider Gecko | *Makrani makra chapkali* | مکڑا چھپکلی |
| *Cyrtopodion kachhense kachhense* (Stoliczka, 1872) | Kachh Spotted Gecko | *Kachh zavia-ungusht chakali* | کچھ زاویہ انگشت |
| *Cyrtopodion kachhense ingoldbyi* Khan, 1997 | Western Spotted Gecko | *Pachhmi Zavia-Ungusht chapkali* | پچھّمی زاویہ انگشت |
| *Cyrtopodion kohsulaimanai* (Khan, 1991) | Sulaiman Range Gecko | *Koh-Sulaiman Zavia-ungusht chapkali* | سلیمانی زاویہ انگشت |
| *Cyrtopodion montiumsalsorum* (Annandale, 1913) | Salt Range Gecko | *Koh-namak Zavia-ungusht chapkali* | کوہ نمک زاویہ انگشت |
| *Cyrtopodion potoharensis* Khan, 2001 | Potohar Gecko | *Potohar Zavia-ungusht chapkali* | پوٹوہار زاویہ اُنگشت |
| *Cyrtopodion scabrum* (Heyden, 1827) | Tuberculate Gecko | *Ubhar-dar Zavia-ungusht chapkli* | اُبھار دار زاویہ اُنگشت |
| *Cyrtopodion watsoni* (Murray, 1892) | Northern Spotted Gecko | *Shamali Zavia-ungusht chapkali* | شمالی زاویہ انگشت |
| *Hemidactylus brookii* Gray, 1845 | Spotted Barn Gecko | *Tika-dar pista ungusht chapkali* | ٹِکیدار زاویہ آانگشت |
| *Hemidactylus flaviviridis* Rüppell, 1835 | Yellow-belly Gecko | *Zarad shakam kota ungusht chapkali* | زرد شکم کوتہ اُنگشت |
| *Hemidactylus frenatus* Schlegel, 1836 | Waif Gecko | *Janli kota ungusht chapkli* | جنگلی کوتہ اُنگشت |
| *Hemidactylus leschenaultii* Duméril & Bibron, 1836 | Bark Gecko | *Chaal kota-ungusht chapkali* | چھال کوتہ آنشت |
| *Hemidactylus persicus* J. Anderson, 1872 | Persian Gecko | *Irani kota-ungusht chapkali* | ایرانی کوتہ اُنگشت |
| *Hemidactylus triedrus* (Daudin, 1802) | Blotched Gecko | *Chittri kota-ungusht chapkali* | چتری کوتہ اُنگشت |
| *Hemidactylus turcicus* (Linnaeus, 1758) | Mediterranean Gecko | *Turkish kota-ungusht chapkali* | ٹرکش کوتہ انگشت |
| *Indogekko fortmunroi* (Khan, 1993) | Munro Gecko | *Fort Munro zavia-ungusht chapkli* | فورٹ منرو زاویہ آانگشت |
| *Indogekko indusoani* (Khan, 1980) | Soan Gecko | *Soan zavia-ungusht chapkali* | سیون زاویہ اُنگشت |

| Scientific names | Common English | Roman Urdu | Urdu |
|---|---|---|---|
| *Indogekko rhodocaudus* (Baig, 1998) | Red-tail Gecko: | *Surakh-dum zavia-ungusht chapkli* | سُرخ دم زاویہ اُنگشت |
| *Indogekko rohtasfortai* (Khan & Tasnim, 1990) | Rohtas Gecko | *Rohtas zavia-ungusht chapkli* | رہتاس فورٹ زاویہ اُنگشت |
| *Mediodactylus walli* (Ingoldby, 1922) | Chitral Gecko: | *Chitrali zavia-ungusht chapkli* | چھیتری زاوایہ آ انگشت |
| *Ptyodactylus homolepis* Blanford, 1876 | Fan-toed Gecko: | *Pankh-ungusht chapkli* | پنکھ اُنگشت |
| *Rhinogecko femoralis* (Smith, 1933) | swollen nose Spider Gecko: | *Nook-dum zavia-ungusht chapkli* | نوک دُم زاویہ اُنگشت |
| *Rhinogecko misonnei* de Witte, 1973 | Long-nose Gecko: | *Nakayli zavia-ungusht chapkli* | نکیلی زاویہ اُنگشت |
| *Siwaligekko battalensis* (Khan, 1993) | Reticulate Plum zavia-ungusht chapkli | *Jal-dar goal-jasm Kirrli* | جالدار گول جسم زاویہ اُنگشت |
| *Siwaligekko dattanensis* (Khan, 1980) | Banded zavia-ungusht chapkli | *Hazara goal-jasm Kirrli* | دھاری دار گول جسم زاویہ اُنگشت |
| *Siwaligekko mintoni* (Golubev & Szczerbak, 1981) | Swati Plump zavia-ungusht chapkli | *Swati goal-jasm Kirrli* | سواتی گول جسم زاویہ اُنگشت |
| *Teratolepis fasciata* (Blyth, 1853) | Flat-tail Gecko | *Chapti-dum chapkili* | چتکبری چپٹی دم زاویہ انگشت |
| *Teratoscincus microlepis* Nikolski, 1899 | Baloch Sand Gecko | *Bloch reg- chipkali* | بلوچستانی ریگ |
| *Teratoscincus scincus keyserlingi* Strauch, 1863 | Turkish Sand Gecko | *Turk reg- chipkali* | تُرکستانی ریگ چھپکلی |
| *Tropiocolotes depressus* Minton & J. A. Anderson, 1965 | Mountain Dwarf Gecko: | *Chittani chipolia* | پہاڑی چھپکلی |
| *Tropiocolotes persicus persicus* (Nikolski, 1903) | Persian Dwarf Gecko | *Irani chipolia* | ایرانی چھپکلی |
| *Tropiocolotes p. euphorbiacola* Minton, Anderson, & J. Anderson, 1970 | Sindh Dwarf Gecko | *Sindhi chipolia* | سندھی چھپکلی |

# Chapter 6

# Agamidae & Chamaeleonidae

Family Agamidae ........................................... 87
Family Chamaeleonidae ............................... 107



*Brachysaura minor*

## Family Agamidae

There are six genera represented in Pakistan

1. ***Brachysaura*:** Body depressed; tympanum distinct, small, deeply sunk; caudal scales irregular, tail equals or slightly shorter than body; male without abdominal and preanal callous scales. Single species.

2. ***Calotes*:** Body compressed; a distinct median dorsal row of pointed elevated scales, extending onto the tail. Tail longer than body. Single species.

3. ***Japalura:*** Body compressed; an indistinct row of elevated scales from head to mid dorsum of body. 2-3 spines at temporal. Single species.

4. ***Laudakia*:** Body depressed; tympanum distinct**,** large, superficial; fifth toe extends beyond second; caudal scales in distinct annuli. Thirteen species represented.

5. ***Phrynocephalus*:** Body depressed; tympanum concealed. Six species represented.

6. ***Trapelus*:** Body depressed; tympanum distinct, small, deeply sunk; caudal scale irregular; tail exceeds body in length; males

with callous preanal scales. Five species represented.

**Key:**

1 Body laterally compressed........................2
Body dorsoventrally depressed.................3

2. Median dorsal row of distinct, pointed, elevated scales, extending to tail ................................*Calotes versicolor*
Median dorsal row of indistinct elevated scales to midbody ....*Japalura kumaonensis*

3. Tympanum distinct...................................4
Tympanum concealed.............................20

4. Tympanum large, superficial; fifth toe extends beyond second; caudals in distinct annuli ........................................................5
Tympanum small, deeply sunk, caudal scale irregular..........................................16

5. Middorsum of body with several rows of homogeneous enlarged scales...................6
Middorsum of body with several rows of heterogeneous enlarged scales.................... ............................*Laudakia nuristanica*

6. Scales of dorsal rows smooth ...................7
Scales of dorsal rows keeled.....................8

7. Patch of strongly enlarged scales on flanks; male with a patch of callous abdominal scales ................... *Paralaudakia. badakhshana*
Patch of enlarged scales on flanks absent; male without callous abdominal scales ...................*Paralaudakia himalayana*

8. Caudal scales large, less than 30 at the base of tail.........................................................9
Caudal scales small, more than 30 at the base of tail...............................................10

9. Head with smooth scales; 8 rows of median dorsal large scales.........*Laudakia pakistanica*
Head with keeled scales; 10 or more rows of median dorsal scales...........................11

10. Large dorsal scale, larger than ventrals; flanks with numerous enlarged scales ............................*Laudakia agrorensis*
Largest dorsal scales, smaller than ventrals, flanks with few enlarged scales ............................*Laudakia tuberculata*

11. Caudal segments distinct, with 2 whorls of scales; tail short, thick, not exceeding 1.5 times the body length..............................12
Caudal whorls 1 or 3 in a segment, tail long, slender, longer than 1.5 times the body.......................................................13

12. Scales round the midbody 115-188 ......................... *Paralaudakia caucasia*
Scales round the midbody 177-259 .......................*Paralaudakia microlepis*

13. Enlarged dorsals in 12 or more rows; tail segment with 3 annuli; adult with spiny excrescences around ear opening............14
Enlarged dorsals in 10 or fewer rows; tail segments with single whorl; spiny excrescences around ear opening small or absent......................................................15

14. Supra labials 13-16, enlarged dorsals in 13-16 rows, dorsum yellow brown to sooty black with few yellow specks on back .....................................*Laudakia fusca*
Supralabials 14-18, enlarged dorsals in 16-20 rows, dorsum olive thickly mottled, limbs with yellow.............. *Laudakia nupta*

15. Bright sandy head, with yellow spotted anterior part of the body….*Laudakia lirata*
Brown olive head, with dark reticulation; dorsum with Dark spots interspersed with bright yellow spots....... *Laudakia melanura*

16. Dorsal scales subequal in size, disposed in irregular rows ..........................................17
Dorsal scales larger about twice the size of smaller and are irregular in arrangement.....18

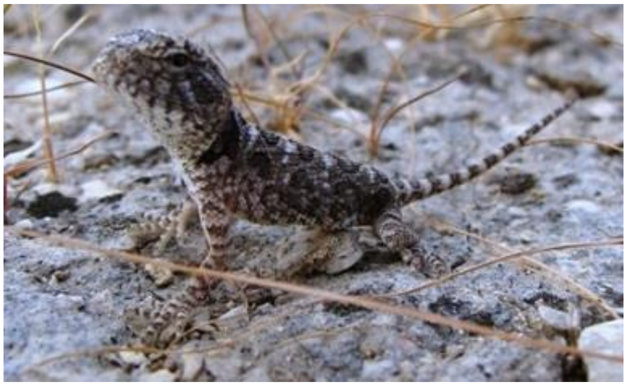
17. Tail exceeds body in length; males with callous precloacal scales ......*Trapelus agilis*
Tail equals or is slightly less than body length; males without callous precloacal scales ........................... *Brachysaura minor*

18. Enlarged dorsal scales rounded; about 100 scales around the midbody........................... ............................*Trapelus rubrigularis*
Enlarged dorsal scales pointed; fewer than 100 scales round the body........................19

19. Largest dorsals about twice the size of smallest; dorsum with reddish or orange ocelli, with dark borders .............................. ............................. *Trapelus megalonyx*
    Largest dorsal scales more than twice the size of smallest; dorsal ocelli absent or without dark borders .................................... ...........*Trapelus ruderatus baluchianus*
20. Dorsal scales markedly unequal in size.......21
    Dorsal scales subequal ............................. 22
21. Enlarged dorsal scales broad, nail-like, with free posterior borders; sides of head and neck without long spinose scales ..................*Phrynocephalus scutellatus*
    Enlarged dorsal scales without posterior free border; sides of head and neck with long spinose scales....................................... ..............*Phrynocephalus luteoguttatus*
22. Spinose scales on head and neck absent......23
    Spinose scales on head and neck present .................. *Phrynocephalus euptilopus*
23. Nasal scales in contact with each other.......24
    Nasal scales not in contact with each other ...................*Phrynocephalus maculatus*
24. Suborbital scale single and elongated .................. *Phrynocephalus clarkorum*
    Suborbital scales 2-3.................................... .......................*Phrynocephalus ornatus*

### *1. Brachysaura minor* (Hardwicke and Gray)
### (**Fig.6.1**)

1. Habitus stout, head enlarged, body feebly depressed.
2. Head scales large, unequal, strongly keeled or tubercular.
3. Canthus and superciliary sharp.
4. Two spines at tympanum on sides, tympanum diameter almost half that of the orbit.
5. Supra- and infralabials 11 to 15.
6. Body with large, strongly imbricate keeled, often mucronate scales, pointing backward and upward.



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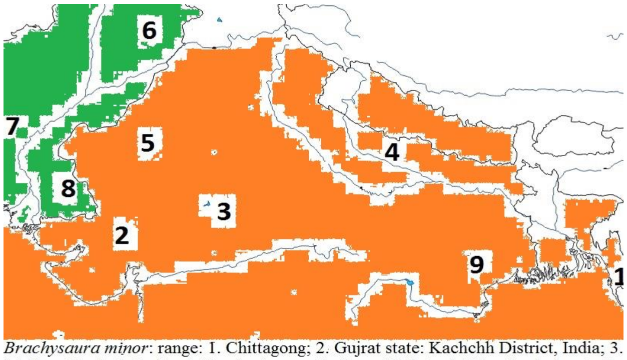
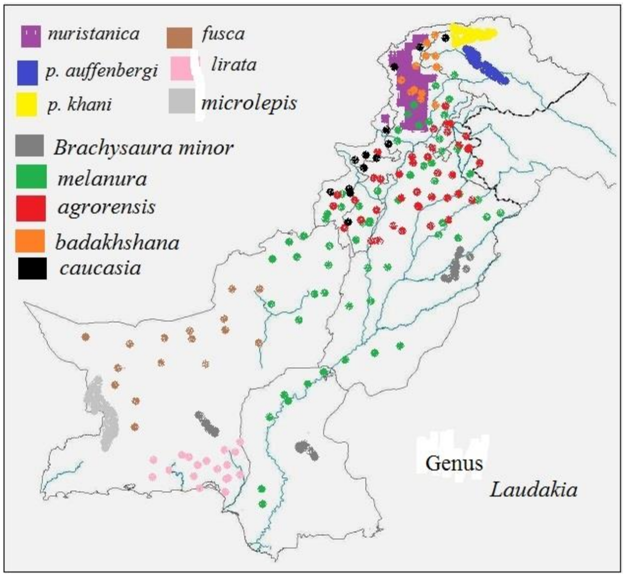


*Brachysaura minor*: range: 1. Chittagong; 2. Gujrat state: Kachchh District, India; 3. Madhya Perdesh, India; 4. Banda, Saugor, Ratlam, Allahabad, Uttar Pradesh; , India 5. Baran, Eastern Rajasthan, India; 6. Rabwah, District Chiniot, Punjab, Pakistan; 7. Mastung, Kalat, Balochistan, Pakistan; 8. Ranikot, District Dadu, Sindh, Pakistan; 9. Satkosia Sanctuary, Orissa.

B



C

**Fig.6.1.** *Brachysaura minor* (Hardwicke and Gray). B shows distribution of *Brachysaura minor* in different parts of Southeast Asia.

7. Ventrals smaller than dorsals, more or less keeled.
8. Scales round midbody 48-58.
9. A denticulate nuchal and dorsal crest.
10. Tail shorter than body, round, with heterogeneous keeled scales.
    Snout-vent length 94-99 mm, tail 92-98 mm.

*Colour*:

Yellowish brown dorsum, with 3 middorsal rows of dark brown light-edged blotches, those of median row larger and rhomboidal. A white streak from nape, bifurcating behind and another from eye to the angle of mouth; limbs with dark crossbars; ventrum yellowish white, throat speckled with gray. Juvenile pinkish brown dorsal blotches edged with light pink.

*Habitat*:

Frequents hard barren desolate deserts. Crepuscular, diurnal in habits, movements sluggish; it does not attempt to escape, rather it flattens itself against the ground and does not move. Burrows in the roots of grasses and thorny bushes.

*Range***:**

Rare, spottily distributed widely in the Indo-Gangetic plains, from Bangladesh through the Central and United Provinces of India into the upper and lower Indus Valleys in Pakistan, where definite records are from Sindh and Punjab, District Jhang.

### ***2. Calotes versicolor versicolor*** (Daudin) (**Fig.6.2**)

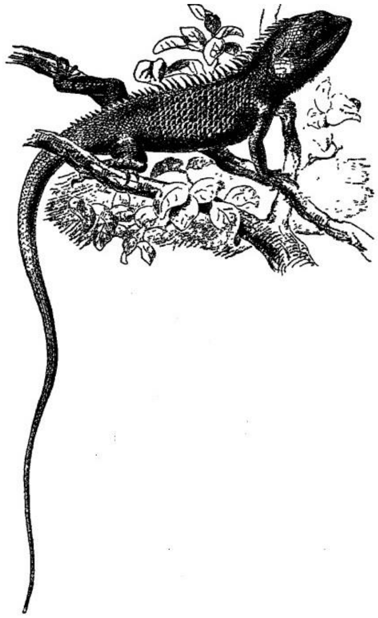
1. Forehead concave; head with unequal, smooth, or feebly keeled scales.
2. A pair of well separated supraorbital spines.
3. Diameter of tympanum half or less than half that of the orbit.
4. Dorsals 35-52 around midbody, keeled, all pointing backward and upward, larger than ventrals. Ventrals keeled.
5. A median row of elongated, sharp tipped dorsals, arranged in a crest which extends from nuchal to the level of vent, progressively decreasing in size backwards.
6. Third and fourth fingers nearly equal fourth toe longer than third. Sexually dimorphic, males longer, have a larger body mass, a prominent gular region, cheeks and longer dorsal spines; develop bright colour pattern at the beginning of rainy season.
   Snout-vent length 135-140 mm, tail 338-350 mm.

*Colour*:

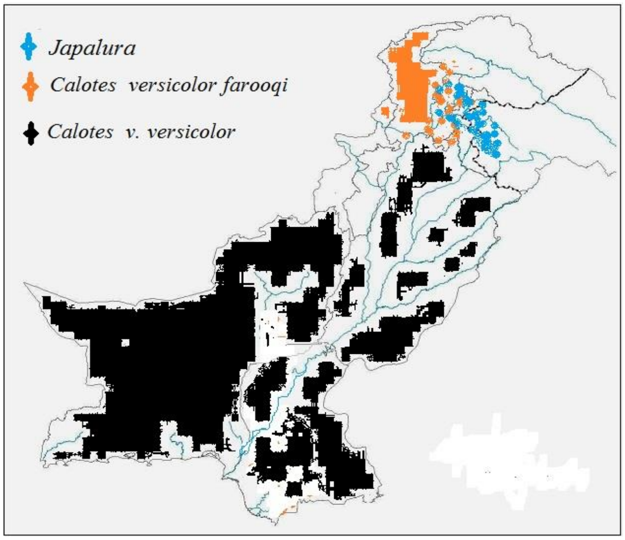
Highly metachromatic, colour changes according sex. Normally body is uniformly light brown or grayish dorsum, with distinct dark brown transverse spots or bars, or variegated with dark brown. Dark streaks radiate from eyes. Juveniles and females often with a pair of dorsolateral stripes on body dorsum, tail with light and dark annuli, ventrum dirty white. Adult male is usually more or less uniform in colour with greenish tinge, throat is dark-barred.

*Habitat***:**

The tree lizard is arboreal and diurnal. It inhabits forests and any situation with trees and shrubs. It invades different biotopes from dry deserts to thick forests throughout the Indo-Pakistan subcontinent and Southeast Asia, from the plains to about 2000 m above sea level, common in gardens and groves.



**A**



**B**

**Fig.6.2.** *Calotes versicolor versicolor* (Daudin). B shows distribution of *Japalura* and species of *Calotes* in different parts of Pakistan.

### *3. Calotes versicolor farooqi* Auffenberg and Rehman

Distinguished on the basis of: short head, lateral body scales pointing upwards and backwards, prescapular fold or pit absent

*Range*:
Alpine Punjab, Pakistan.

### *4. Japalura kumaonensis* (Annandale)

(**Fig.6.3**)

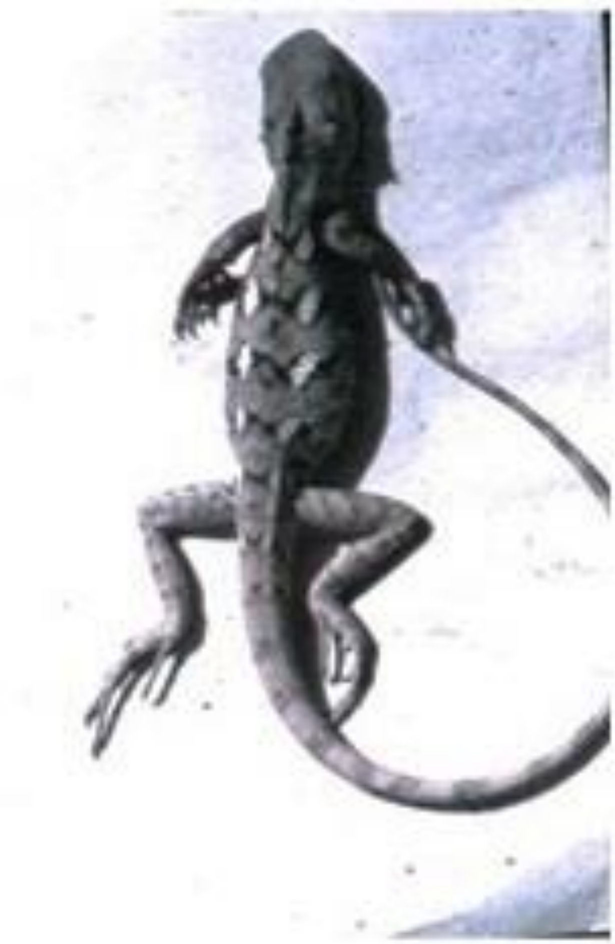


**Fig.6.3.** *Japalura kumaonensis* (Annandale).

*Colour*: Body gray to dark brown, with a median row of triangular dark markings edged with white.

1. Body compressed.
2. Dorsals heterogeneous.
3. Dorsal crest a mere denticulation, reaches to the midbody.
4. No preanal or femoral large scales.
5. Supralabials 6.

6. Fourth toe as long as tibia.
   Snout-vent length 60-63 mm, tail 123-127 mm.

*Habitat*:
Characteristic of low hilly tracts, with moderate vegetation in mesic habitat

*Range*:
Recorded from Hazara District in eastern, Pakistan. Its range extends to Kumaon District in western Himalayas, India.

### ***5. Laudakia agrorensis*** (Stoliczka)
(**Figs.6.4 & 6.1C)**

1. Head with keeled scales.
2. Numerous spinose scales on sides of head and neck.
3. Median dorsals distinctly larger than ventrals and strongly keeled, arranged in 8-12 longitudinal rows, an intervening vertebral series of small scales may be present, which extend to the occiput.
4. Flanks of body with numerous enlarged strongly keeled scales.
5. In addition to the callose preanal scales an oblong patch of large callose scales is present along the flanks of the body.
6. Tail segmented, with three whorls, round the base of tail 30-40 scales.
   Snout-vent length 105-110 mm, tail 245-250 mm.

*Colour*:
Dorsum dark olive, spotted and reticulated with dark spots usually arranged in longitudinal series; head paler, ventrum uniformly whitish, throat and chest heavily marbled with dark blue. Juveniles have variegated dorsum spotted with black and pale yellow, or there are three longitudinal yellow dorsal stripes, the median extending onto the tail; throat is reticulated with dark while rest of the ventrum is dirty white.

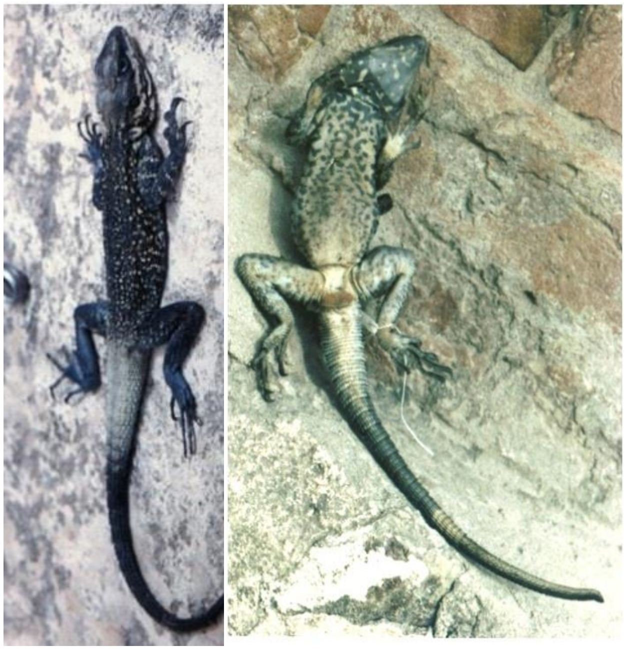


**Fig.6.4.** *Laudakia agrorensis* (Stoliczka).

*Habitat*:
The Agrore valley agama is very common around Ooghi Fort, in District Manshera, Khyber Pakhtunkhwa, Pakistan. It lives in crevices among rock blocks.

*Range*:
Widely distributed in Ooghi Valley, around Manshera and Abbottabad, extending down into the Jhelum Valley, and northward into Chitral.

### ***6. Laudakia fusca*** (Blanford)
(**Figs.6.5 & 6.1C**)

1. Large sized agama, with large head.
2. Circum-auditory spiny excrescences are more numerous and prominent.
3. Enlarged mid-dorsals in 13-16 rows are strongly mucronate.
4. Tail annuli composed of 3 whorls.
5. Callous patch in male.
   Snout-vent length 159-162mm, tail 289-300 mm.

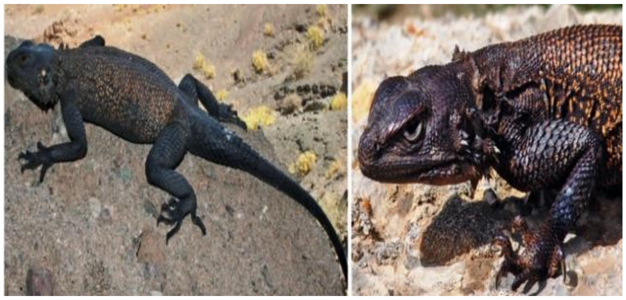


**Fig.6.5.** *Laudakia fusca* (Blanford).

*Colour*:
Head of male bright yellow, body, limbs and tail dark brown to sooty black above and below, with few yellow speckles on back. Callose abdominal and preanal scales are reddish brown. Females light brown to reddish, with slight speckles of yellow. Tail distally dark, ventrum yellowish.
Juvenile grayish yellow, with narrow yellow irregular crossbars, or a reticulate pattern. Head black with a large yellow mark on top and similar spots on temporal, occiput, neck, and shoulders. Tail banded dark.

*Habitat*:
Frequents vertical rocks along ravines with a lot of holes and crevices. When disturbed it takes to the rocks, waits for some time observing the intruder from behind the rocks, then scrambles about freely. It forages far and wide in nearby low-lying strips of land with grassy growths and occasional bushes.

*Range*:
Widely distributed in southern Iran, Baluchistan, and southwestern Sindh, Pakistan, up to an elevation of 1800 m. The author has seen it in the Kalabag area in northwestern Punjab, Pakistan.

### 7. *Laudakia lirata* (Blanford)
(**Figs.6.6 & 6.1C**)

Distinguished from *Laudakia melanura* by:

1. Bright sandy head and yellow spotted anterior part of body.
2 Strongly keeled dorsals.
Snout-vent length 121-135, tail 225-285 mm.

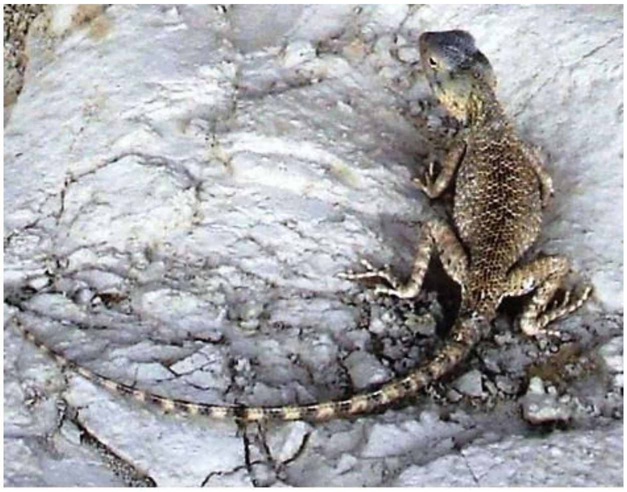


**Fig.6.6.** *Laudakia lirata* (Blanford).

*Range*:
From Kirthar range, Hab Chauki, Mekran Coast, and Astola Island.

### 8. *Laudakia melanura* Blyth
(**Fig.6.**7 **& 6.1C**)

1. Naris piercing canthus.
2. Head with large, subequal, smooth, or obtusely keeled scales.
3. Supralabials 12 to 16.
4. Posterior lateral sides of head with groups of short spines.
5. Neck scales granular, except those of median line which form a low crest.
6. Ventrals smooth, not half as large as median dorsals.
7. Gulars smaller than ventrals. A gular sac is absent.
8. Tail depressed, oval, covered at base with large subequal scales, dorsal and lateral caudal scales strongly mucronate, ventral caudals are flat.

Snout-vent length 140-145 mm, tail 280-295 mm.

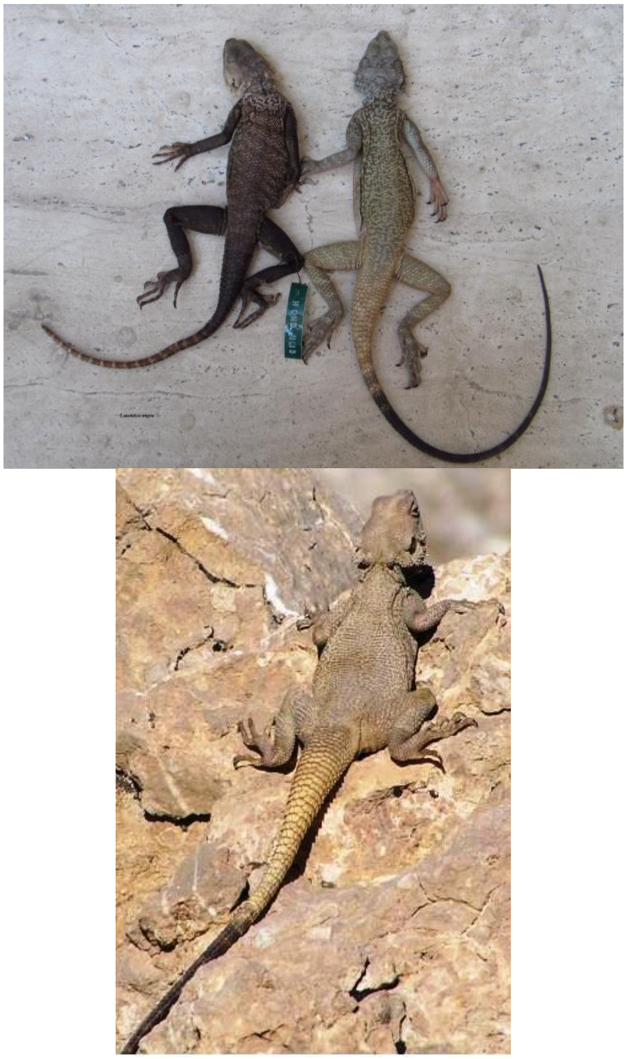


**Fig.6.7.** *Laudakia melanura* Blyth.

*Colour*:

In life, dorsum brownish olive with smaller more or less confluent dark spots, interspersed with large bright yellow spots; a dark reticulation on head; tail pale yellowish at base, but for greater part of its length entirely black. Body dorsum in young olive, yellowish white ventrum, head, chin, chest reticulated with black; neck, body, limbs, and base of tail with numerous small black and yellow spots; eyelids and superciliary ridges yellow; tail dusky black at its tip.

*Habitat*:

Mountain species, feeds on vegetation, occasionally taking insects.

*Range*:

Recorded from rocks of moderate elevation from eastern Iran, Balochistan, extending into the Salt Range, Punjab, and western hilly tracts of Sindh, Pakistan.

*Two races*:

Scales around midbody 120-150. Male with a large patch (4-5 rows) of callose preanal and another at mid-abdomen......................................................................*Laudakia melanura melanura*

Number of scales round midbody more than 150. No patch of spinose scales on flanks......................................*Laudakia melanura nasiri*

### 9. *Laudakia nupta* (de Filippi)
(**Fig.6.8**)

1. Head scales subequal, smooth, or obtusely keeled.
2. Supralabials 14 to 18.
3. Posterior sides of head and neck with numerous groups of long spines, while rest of scales of the region are granular, except those of median dorsal line which form a low crest.
4. Median dorsals homogeneous, imbricate, broader than long, keeled, mucronate, arranged in 16-20 oblique series with a middorsal convergence.
5. Flanks of the body with very small scales pointed backward and downward, without enlarged scales.
6. Ventrals smooth, smaller than dorsals, gulars smaller than ventrals.
7. Tail depressed, oval, segmented, each segment with more than 2 whorls, or

segments are indistinct. The caudal scales are large, subequal, mucronate**;** subcaudals are flat.

8. Males with 3 or 4 rows of callose preanal scales and a midabdominal patch of similar scales.

   Snout-vent length 170-172 mm, tail 289-305 mm.

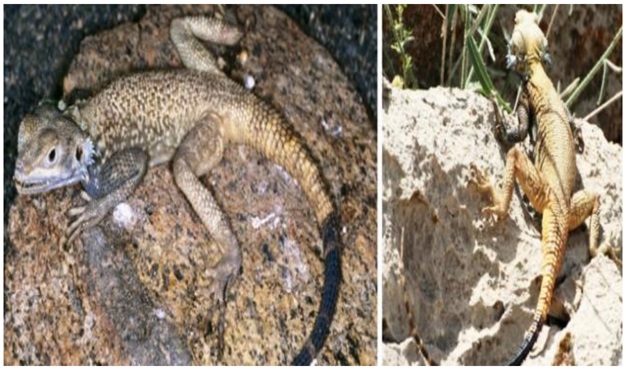


**Fig.6.8.** *Laudakia nupta* (de Filippi).

*Colour*:

Dorsum olivaceus, thickly speckled or mottled**,** limbs with yellow, tail similar or uniformly brownish, or banded with black, or its posterior half may be dark. Flanks marbled with gray and yellow. Ventrum yellowish brown, throat with large dark-blue spots.

*Habitat*:

This agama is shy and inhabits mountain peaks, taking shelter in crevices among rock blocks at an elevation of 1800-2000 m.

*Range*:

From eastern Iraq, Afghanistan, Iran, Balochistan to southwestern Sindh**,** Waziristan Hills in Khyber Pakhtunkhwa and Kalabag area in northwestern Punjab, along the western bank of the Indus.

### *10. Laudakia nuristanica* Anderson and Leviton (**Figs.6.9 & 6.1C**)

1. Head, body, and tail strongly depressed, tail longer than body, segmented, each segment of 4 whorls; 45 scales around base of the tail.
2. Tympanum large, superficial. Three clusters of enlarged spinose scales around tympanum, and a pair on neck.

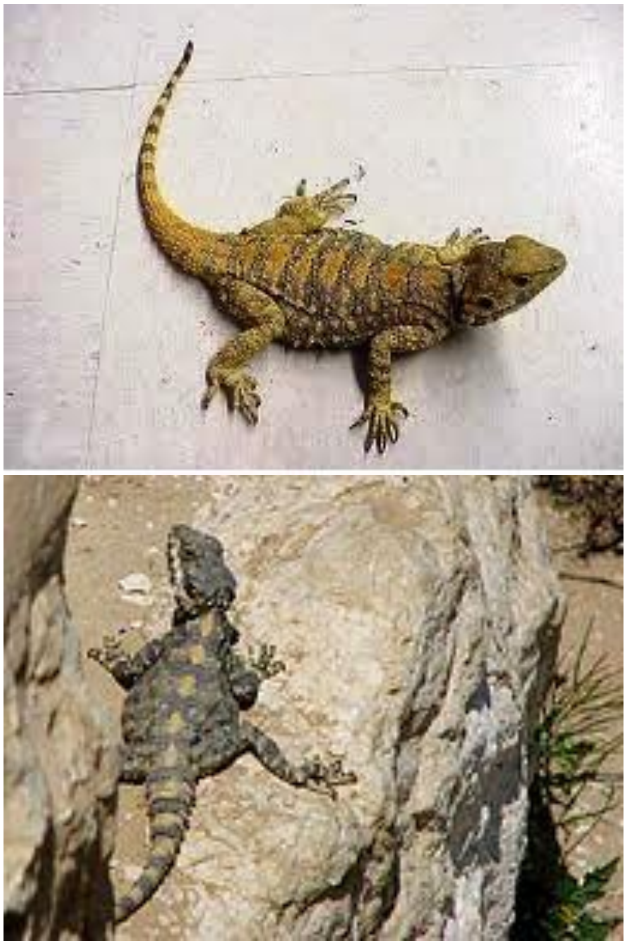


**Fig.6.9.** *Laudakia nuristanica* Anderson and Leviton

3. Median dorsals heterogeneous, not arranged in regular rows, with few strongly keeled scales which are about twice as large as largest ventrals, dorsolaterals granular, flanks with scattered enlarged scales, not in groups.
4. Limbs with strongly heterogeneous spiny scales.
5. Naris in a large scale below canthus.

6. Supralabials 13, infralabials 11-12.
7. A preanal patch of 7 rows of callose scales, another at midabdomen of 17 rows.
   Snout-vent length 130-135 mm, tail 238-250 mm.

*Colour*:
In formalin, olive brown above, head and limbs dark gray, corners of eyelids cream, 3 short dark bars on supracilliaries, median descending across eye; enlarged middorsals light gray interspersed with dark flecks; enlarged tubercles on flanks, light gray, contrasting sharply from olive brown ground colour; ventrum dirty white mottled with gray, throat with cream spots; posterior two-thirds of tail very dark brown, nearly black; fingers and toes barred with dark.

*Habitat*:
Inhabits crevices among wet rocks and boulders along water courses in a conifer biotope of evergreen forests at 500-600 m of elevation.

*Range*:
This species has recently been recorded from Ziarat, Khyber Pakhtunkhwa, Pakistan.

### ***11. Laudakia pakistanica*** (Baig)
(**Fig.6.10**)

1. Head scales smooth.
2. Distinct 8 rows of middorsal spinose scales.
3. Vertical rows of enlarged spinose scales on flanks.
4. In male 6 and in female 3 precloacal callose scales.
5. Number of scales round the base of tail 30-40.
6. A distinct patch of large spines on flanks.
7. Tail segments with 3, rarely 4 whorls.
   Snout-vent length 150 mm, tail 240+ mm.

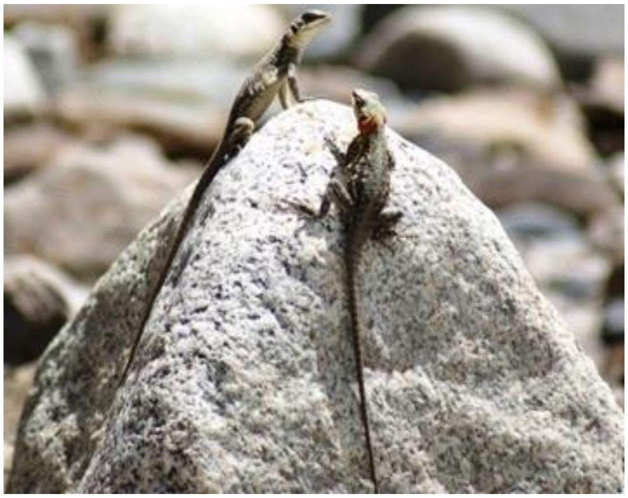


**Fig.6.10.** *Laudakia pakistanica* (Baig).

*Colour*:
In formalin, dorsum jet black, chest, neck, and gular region speckled with orange; ventrum dark gray; groin speckled with yellow.

*Habitat*:
The rock agama inhabits dry barren rocky mountains away from human settlements.

*Range***:**
Widely distributed around Gilgit to Manshera, northeastern Pakistan, along the River Indus.

*Three subspecies:*
Midbody scales 150-166; dorsum dull dark brown-gray, with white bars, head and distal part of tail black. Gular region bluish black with irregular pale yellow blotches, ventrum pale yellow with thick dark ............................................ reticulation........ *Laudakia pakistanica auffenbergi*
Midbody scales 146-158; dorsum silver gray with black mosaic, head black with scattered light scales; limbs barred with black .................. *Laudakia pakistanica khani*
Midbody scales 168-178; uniform jet black, Head speckled below with yellow orange .........*Laudakia pakistanica pakistanica*

### **12. *Laudakia tuberculata*** (Hardwicke and Gray)
### (**Fig.6.11**)

1. Head with heterogeneous, convex, smooth, or keeled scales.
2. Posterior sides of head and neck with small spinose scales; those around ear arranged in series, while on neck in groups which are sometimes absent; rest of the neck scales are granular.
4. Median dorsals subequal, roundish, imbricate, keeled; 10-15 across the midback.
5. Flanks with small scales, and few scattered enlarged keeled scales.
6. Ventrals smooth, as large as the dorsals.
7. Gulars much smaller than ventrals, no gular sac.
8. Skin of neck loose.
9. Tail depressed, segmented with four whorls of subequal strongly keeled scales, more than 40 at thickest part.
10. Male with 6-7 rows of callose preanal scales and an elongated midabdominal patch.

    Snout-vent length 145-150 mm, tail 150-160 mm.

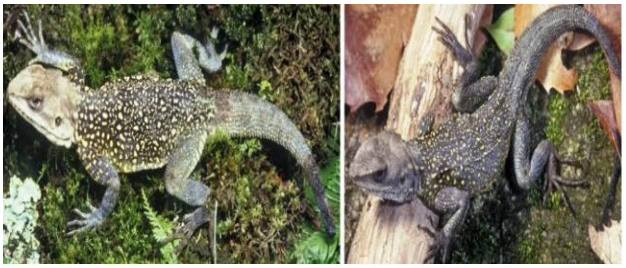


**Fig.6.11.** *Laudakia tuberculata* (Hardwicke and Gray).

*Colour*:

In juvenile, dorsum is dark olive brown, with numerous dark spots arranged in longitudinal series on sides of a light vertebral line. In adult, dark spots tend to break and are replaced by a mixture of dark brown and yellowish specks. Head pale, ventrum whitish or brown, throat and often chest heavily marbled with dark blue.

In life, male is gorgeously colored; shoulders, chest, and flanks are spotted with bright yellow or orange. In adult male, ventrum is of bright bluish black tinge with purple on throat, sides of neck, shoulders, and belly.

*Habitat*:

Commonest agamid in the western Himalayas, inhabits rock blocks at elevations of 1500-2500 m. The lizard is predominantly herbivorous, occasionally resorting to insectivory.

*Range*:

Reported from eastern Afghanistan, northern Pakistan, and Kashmir up to Nepal.

### **13. *Paralaudakia badakhshana***
### (Anderson and Leviton)
### (**Figs.6.12 & 6.1C**)

1. Head Scales smooth.
2. Scales around tail in distinct 2-4 whorls, scales round base of the tail 19-25.
3. Middorsals enlarged, smooth or weakly keeled, distinctly larger than ventrals.
4. A patch of large mucronate scales on flanks, and large patch of callous scales at abdomen.

    Snout-vent length 65-70 mm, tail 99-108 mm.

*Colour*:

Dorsum olive gray, enlarged dorsals uniformly gray, bordered by longitudinal rows of irregular dark spots; dark-edged white ocelli are arranged in oblique rows on back, flanks mottled with dark gray. Tail with small dark spots arranged as cross bars. Ventrum grayish white, limbs marbled with gray, digits barred.

*Habitat*:

The lizard inhabits rocks between 450 and 2400 m of elevation. It has been collected from clay

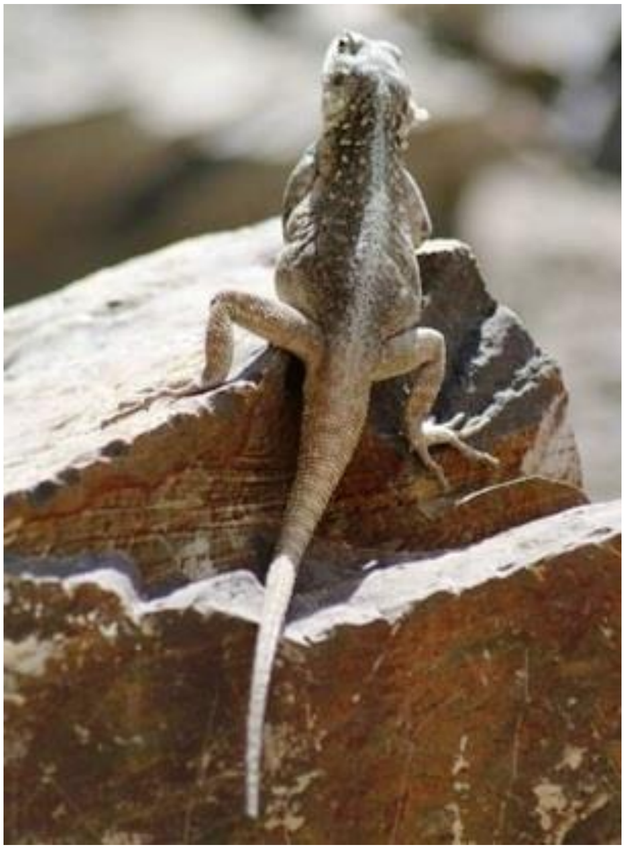


**Fig.6.12.** *Paralaudakia badakhshana* (Anderson and Leviton).

loess, slopes, and plateau rock structures, dry water courses, and in dry mountain habitat.

*Range*.
Afghanistan, Sost and Gulmit, near Khunjrab Pass, in northeastern Pakistan.

### 14. ***Paralaudakia caucasia*** (Eichwald)
### (**Figs.6.13 & 6.1C**)

1. Head top with heterogeneous scales, smallest on the upper eyelid. Posterior sides of head and neck with numerous groups of large spinose tubercles, rest of neck scales very small.
2. Supralabials 12 to 16.
3. Median dorsals more or less hexagonal, imbricate, smooth or obtusely keeled, 6-10 across midback, abruptly separated from very small dorsolaterals.
4. Lateral scales of body intermixed with large squarish spinose scales and a large patch on flanks is usually present.
5. Tail depressed at base, oval in cross section, covered with large spinose scales, segmented, 2 whorls to a segment.
   Male with 4-5 rows of callose preanals, and an elongated midbelly patch.
   Snout-vent length 143-145 mm, tail 185-205 mm.

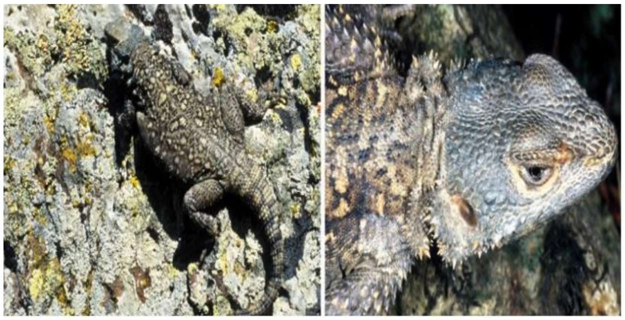


**Fig.6.13.** *Paralaudakia caucasia* (Eichwald).

*Colour*:
Olivaceus or yellowish brown above, with yellow or black markings; body dorsum with pale yellow spots bordered with black, spots may coalesce into a median row of crossbars, more vivid in anterior half of body. Head uniformly yellow or spotted with black. Tail yellowish or olivaceus, with or without dark annuli, yellowish below. Throat heavily marbled with dark blue or black; belly and under surface of limbs dark blue.
Young grayish or olivaceus above with jet black spots, which may join each other to form narrow crossbars.

*Habitat*:
Frequents boulders in stream beds, living in crevices among rock blocks.
*Range*:
Waziristan and northern Balochistan, between 1800 and 3000 m.

### *15. Paralaudakia himalayana (*Steindachner)
### (**Fig.6.14**)

1. Head scales heterogeneous, convex, smooth or keeled, largest on snout.
2. Posterior side of head and neck with small spinose scales, periauricular spines arranged in rows while those on neck in groups, neck scales granular.
3. Supralabials 10 to 12.
4. Median dorsals subequal, round, imbricate, feebly keeled, 8-14 across middorsum.
5. Laterals small, with no enlarged scales, adult male may have a patch of large scales at midventrum of body.
6. The skin is loose on sides of neck and body, ventrals smooth, smaller than median dorsals. Gulars smaller than ventrals, no gular sac.

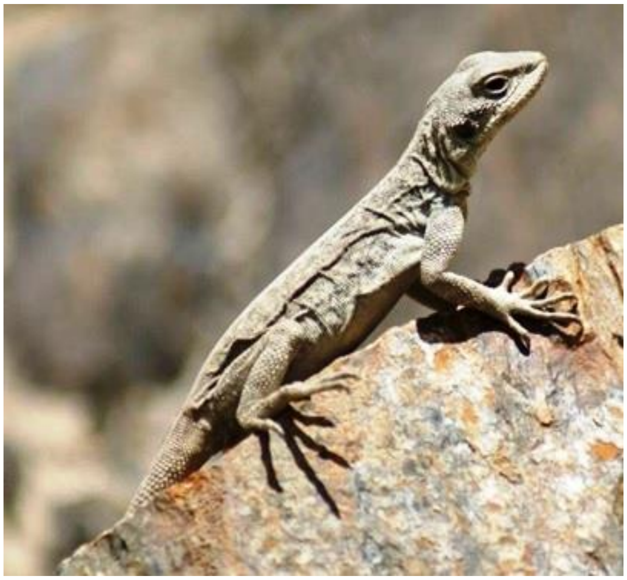


**Fig.6.14.** *Paralaudakia himalayana (*Steindachner).

7. Hind limb reaches to the ear or eye.
8. Tail depressed at base, oval in cross section, 40 or more strongly keeled subequal scales around its thickest part.
9. Male and female have 2-3 rows of callose preanal scales, no abdominal patch.

   Snout-vent length 100-105 mm, tail 139-148 mm.

*Colour*:
Dorsum olive, marbled with black, round light spots may form a network; sometimes a dorsolateral series of black spots or spots may join to form sinuous groups. Tail barred with black, greenish white below, throat of male spotted or marbled with gray.

*Habitat***:**
Recorded from remote areas of northern Pakistan, between 3000 and 3200 m of elevation. It is active by April, and becomes common on rocks by May-June. It feeds on vegetation and occasionally on lizards and arthropods.

*Range*: From the western Himalayas to Tajikistan. In Pakistan it has been recorded from Gilgit and Chitral.

### 16. *Paralaudakia microlepis* (Blanford)
### (**Figs.6.15 & 6.1C**)

1. Close to *Laudakia caucasica* differing from it by having: Scales around the midbody 177-235 in male, 190-259 in female (Anderson, 1999).
2. A single male, collected from 5 miles N of Koh-a-Taftan, western Balochistan, with 195 midbody scales,
   Snout-vent length 135, tail 125 mm.

*Colour***:**
Body dorsum darker than lighter tail

*Natural history note***:**
Collected from out crop of rocks. Sighted several lizards, caught one.

*Range***:**
Widely distributed in southern, central, and eastern parts of Iranian Plateau rare in Pakistan.

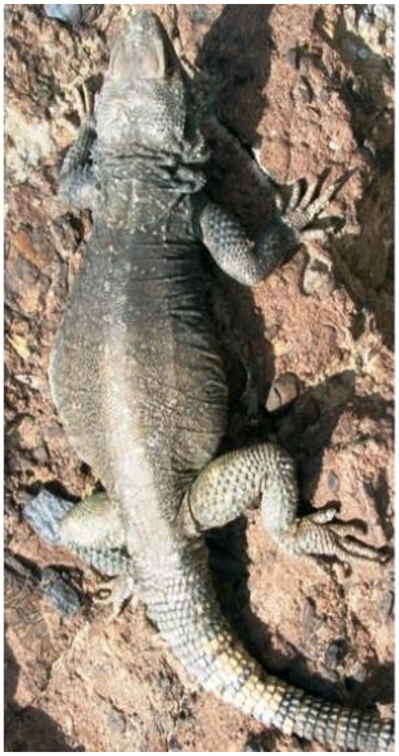


**Fig.6.15.** *Paralaudakia microlepis* (Blanford)

### 17. *Phrynocephalus clarkorum*
S. Anderson and Leviton
(**Fig.6.16**)

1. Nasals in contact with each other.
2. A single elongated suborbital scale.
3. Dorsals subequal in size.
4. No spiny scales on head and neck.
5. Both sides of fourth toe and lateral aspect of third, fringed with pointed scales.
   Snout-vent length 40-45 mm, tail 50-54 mm.

*Colour*:
Dorsum sandy gray with two rows of dark spots along middorsum. A distinct, dark-lined dorsolateral light stripe, from posterior angle of eye, extending along body, onto tail. A series of elongated oval brown spots down the vertebral line, linked by a lighter chain. Ventrum white, underside of tail yellow-green in life, with 5 dark crossbars, tip white.

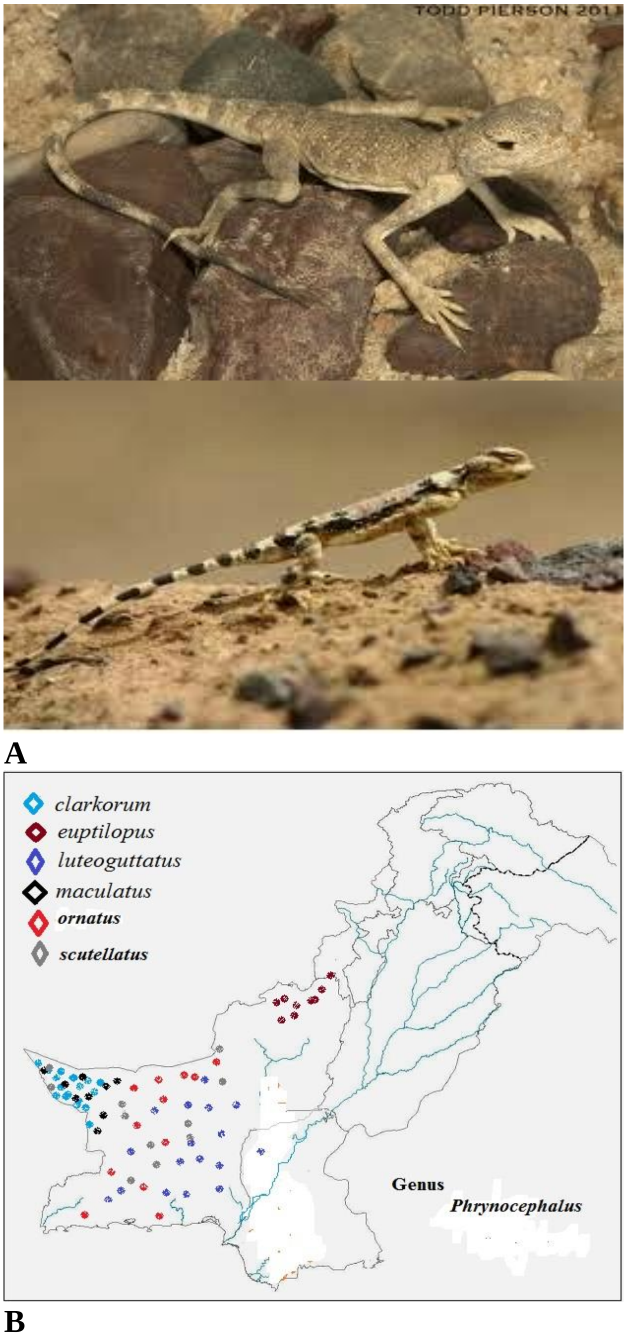


**Fig.6.16.** *Phrynocephalus clarkorum* S. Anderson and Leviton.

*Habitat*:
The striped toad agama is adapted to varying ecological conditions: large active sand dunes, strips of firm sand, narrow ridges of hard soil,

gravel plains and stony wastes, interspersed in the general scenario of a continuous sea of sand. Intervening strips of hard soil support grass tussocks, stunted bushes, and low xerophytic shrubs. The agama quickly takes to a nearby shelter where it remains motionless and undetected; however, where no shelter is available it quickly buries itself in sand.

*Range*:
Recorded from the sandy deserts of southern Afghanistan and western Balochistan.

### *18. Phrynocephalus euptilopus* Alcock and Finn
**(Figs.6.17 & 6.16B)**

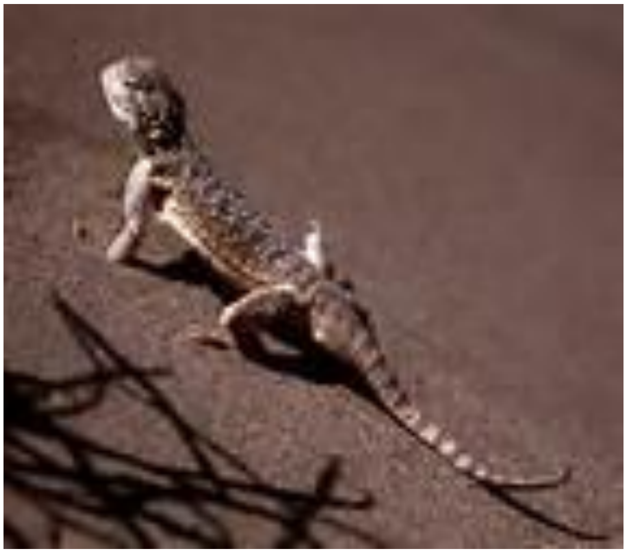


**Fig.6.17.** *Phrynocephalus euptilopus* Alcock and Finn.

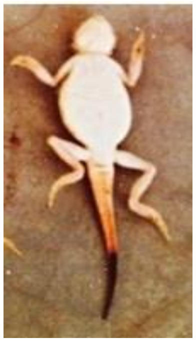
1. Dorsals subequal.
2. Spinose scales on head and neck.
3. Nasals in contact with each other or partially separated.
4. Hind limb reaches to the eye.
5. Digits long, with well developed lateral denticulations, length of which exceeds digit's breadth.
   Snout-vent length 60-63 mm, tail 63-65 mm.

*Colour*:
Dorsum sandy, with black speckles. Head with irregular blotches. Five rounded spots on nape and shoulder. Ventrum whitish, tail tip black.

*Habitat*:
Nothing is known about its natural history.

*Range*:
Reported from Darband, Balochistan, at an elevation of 900 m.

### 19. *Phrynocephalus luteoguttatus* Boulenger
**(Figs.6.18 & 6.16B)**



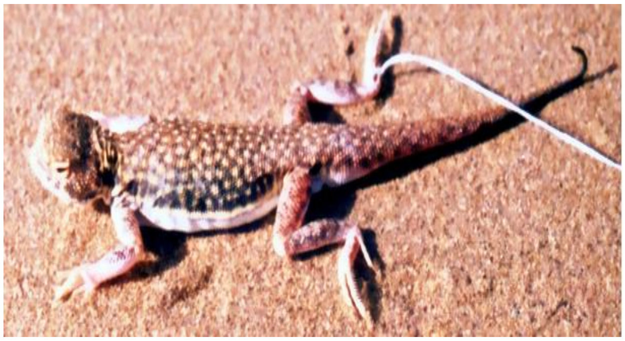


**Fig.6.18.** *Phrynocephalus luteoguttatus* Boulenger.

1. Dorsals markedly heterogeneous.
2. Sides of head and neck with long spinose scales.
3. Nasals in contact with each other or partially separated.
4. A series of elongated scales bordering head crown from front.
5. Hind limb reaches to eye.

6. Digits strongly denticulate, length of denticulation equals breadth of toe.
   Snout-vent length 44-47 mm, tail 43-45 mm.

*Colour*:
Dorsum gray to blue-black, with numerous irregularly scattered small round yellow spots. Limbs sandy to pinkish. Anterior half of tail pinkish, while posterior black. Ventrum white.

*Habitat*:
Chacteristic of fine windblown sand dunes with sparse stunted bushy vegetation. It is sluggish, moving rather slowly on the sand dunes. It usually it keeps its short tail parallel to its body; when excited it repeatedly curls its tail up and straightens it. It buries itself in sand by displacing it with rapid lateral shivering movements of its body, practically sinking itself into the sand, leaving a characteristic impression of its body on the surface, indicating from where it can be picked up.

*Range***:**
Known from western Balochistan around Nushki, southward to Las Bela, northward it extends into southern Afghanistan and western Iran.

### ***20. Phrynocephalus maculatus*** J. Anderson
(**Figs.6.19 & 6.16B**)

1. Dorsals subequal.
2. No spinose scales on sides of head and neck.
3. Nasals separated by 1-2 scales.
4. Mental larger than adjacent labials.
5. Outer borders of third and fourth toe feebly denticulate.
   Snout-vent length 70-74 mm, tail 115-120 mm.

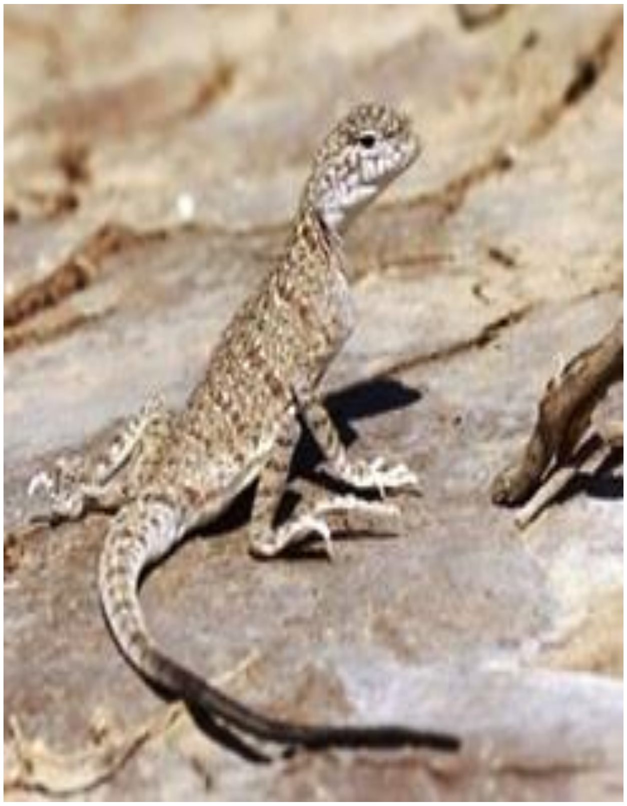


**Fig.6.19.** *Phrynocephalus maculatus* J. Anderson.

*Colour*:
Dorsum sandy brown or grayish, speckled with black and white or dull yellow. Limbs with faint dark bars, sometimes with black spots which may unite to form crossbars on body and limbs. Distal one-third of tail black. Ventrum dirty white.

*Habitat*:
The whip tail toad agama prefers tracts of hard soil among sand dunes, close to scrubby growth. This vegetation supports various types of deserticolous arthropod populations which form the primary diet of this agama; it also feeds on leaves and twigs.

*Range*:
Wide ranging from Arabia, Iraq, Afghanistan, and Iran to western Balochistan, Pakistan.

### *21. Phrynocephalus ornatus* Boulenger

(**Figs.6.20 & 6.16B**)

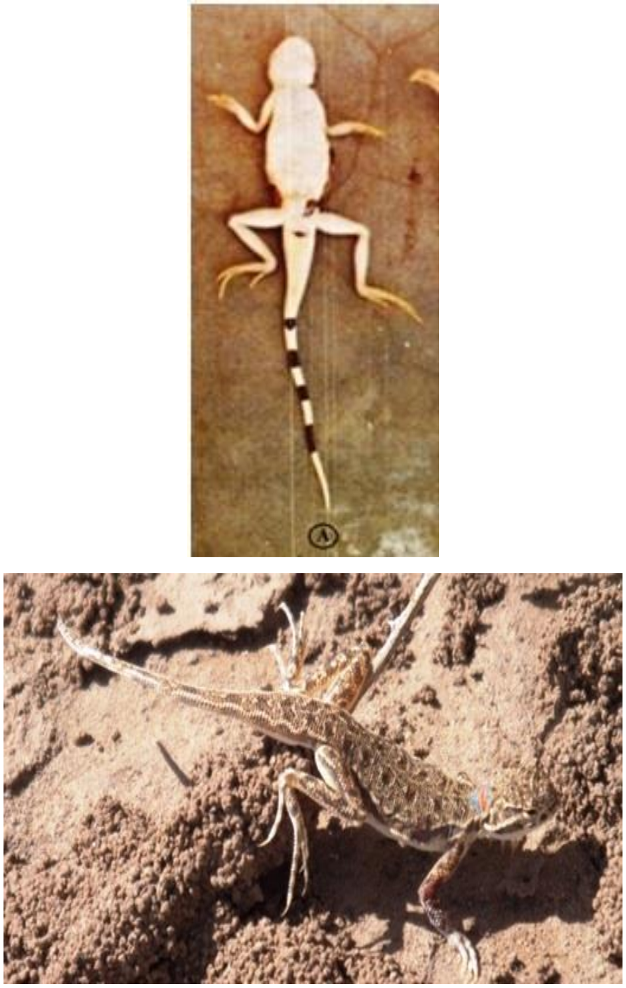


**Fig.6.20.** *Phrynocephalus ornatus* Boulenger.

1. Dorsals subequal.
2. No spinose scales on sides of head and neck.
3. Nasals in contact with each other or partially separated.
4. Suborbital scales 2-3.
5. Hind limb reaches to naris or beyond.
6. Outer borders of third and fourth toes denticulate, denticulation size equals the breadth of toe.

   Snout-vent length 42-47 mm, tail 50-54 mm.

*Colour*:
The striped toad agama is light gray to sandy brown, with 1-3 pairs of reddish spots and scattered dark dots. A dorsolateral white to light yellow stripe, bordered with black. Tail ventrum pale yellow, with 4 or 5 dark crossbars, body ventrum white.

*Habitat*:
Inhabits windblown sand dunes with sparse vegetation of stunted bushes.

*Range*:
Known from the Chagai Desert, extends to Las Bela in the south and to southern Afghanistan in the north and west to southeastern Iran.

### 22. *Phrynocephalus scutellatus* Olivier

(**Figs.6.21 & 6.16B**)

1. Dorsals unequal.
2. Head and neck sides without spinose scales.
3. Nasals in contact with each other, rarely separated by scales.

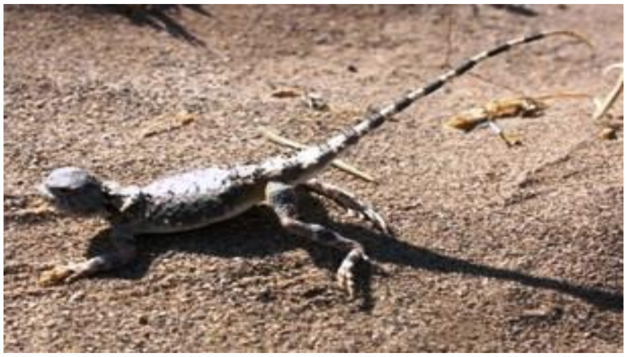


**Fig.6.21.** *Phrynocephalus scutellatus* Olivier.

4. Mental larger than adjacent labials.
5. Outer borders of third and fourth toes denticulate, length of which equals the breadth of toe.

   Snout-vent length 50-56 mm, tail 72-78 mm.

*Colour*:
Grayish or brownish above, with light and dark markings, flanks darker. A median dorsal broad crimson stripe in adults. Limbs and tail barred. Ventrum white, with 6-7 dark bands under tail.

*Habitat*:
Characteristic of hard stony terrain with sparse vegetation. It is very active and runs from one shelter to another. Unlike its congeners it does not bury itself in sand, but escapes into burrows made in the roots of bushes and under boulders. When cornered, it takes an offensive stance by raising its body and attacking with open mouth and lashing tail.

*Range*:
Ranges in desert basins of Iran, Afghanistan, and Balochistan.

## ***23. Trapelus agilis* (Oliver)**

**(Fig.6.22)**

1. Head with heterogeneous, convex, smooth or keeled scales, largest at the snout.
2. Short spines on occiput and tympanic region.
3. Supralabials 15-18, their free margins form denticulated upper lip.
4. Tympanum deeply sunk, smaller than eye.
5. Dorsum with uniform rhomboidal, imbricate, keeled, often mucronate scales, spines of the median rows point straight backward and downward.
6. Ventrals are as large as laterals, smooth or feebly keeled.
7. Male with short gular sac and has 1-3 rows of callose preanal scales.

   Snout-vent length 90-108 mm, tail 150-164 mm.

*Colour*:
*Trapelus agilis* displays rapid metachromatic changes. Usually the male is brown, gray, or dull yellow with dark crossbands on body and light spots on flanks, which may change to more or less completely suffused with bright cobalt blue; tail bright yellow with dark brown bands; throat, chest, and belly normally whitish, streaked with gray and lavender, may change to deep ultramarine blue.

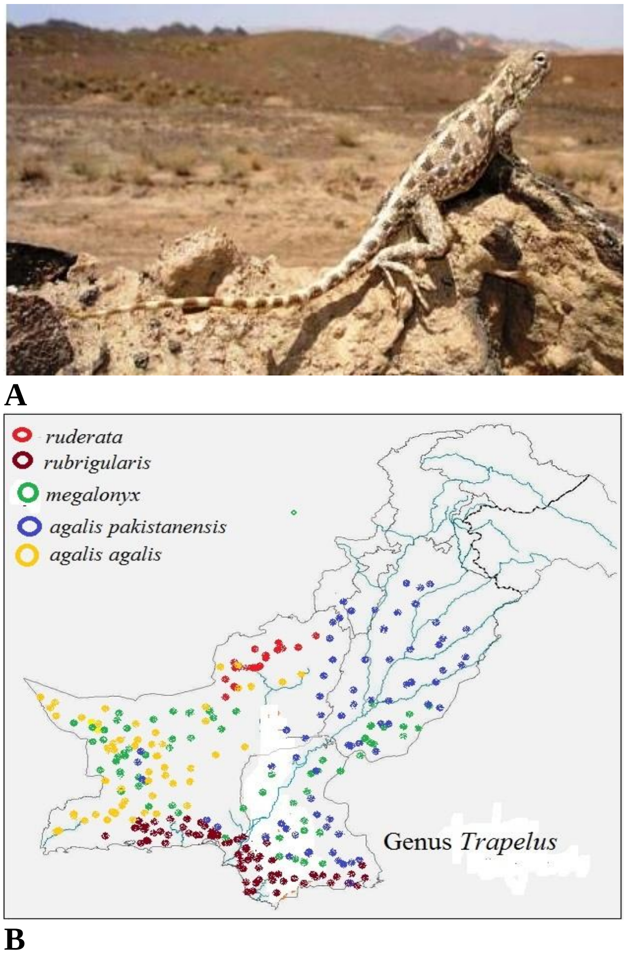


**Fig.6.22.** *Trapelus agilis* **(**Oliver**).** B shows distribution of different species of Genus *Trapelus* in different parts of Pakistan.

*Habitat*:
A typical open desert species, with clay, gravel and moderately sandy soil. Vegetation comprises of scattered shrubs or mounds with grass and herbs, or it is dry grassland with marginal thorny bushes.

*Range*:
From western Iran through Afghanistan and Central Asia (to southern Kazakhstan), Pakistan and Rajasthan, India.

**Races:**

**1a**. Tail almost always round, two (or more) rows of callose preanal scales; 65-91 scales around body; dorsal scales subequal, weakly to moderately keeled, often strongly mucronate; ventral scales smooth or weakly keeled. ............................ *Trapelus agilis agilis*

*Range*:
Central Iranian Plateau, central and southern Afghanistan, southwestern Pakistan.

**1b**. Tail often compressed, one row of callose preanal scales, in case of two, the second undeveloped (preanals absent or weakly developed in females). Dorsal scales subequal to homogeneous, distinctly keeled, mucronate, usually clearly set off from small dorsolaterals; 67-83 scales around body; ventrals distinctly keeled in adult males; background coloration often ................................................................... sandy-grey............ *Trapelus agilis pakistanensis*

*Range***:**
Southeastern Pakistan and adjoining northwestern India.

### *24. Trapelus megalonyx* Günther
(**Figs.6.23 & 6.22B**)

1. Dorsals heterogeneous, larger are arranged in groups, some scales smooth, other feebly or strongly keeled or mucronate, strongly imbricate and less rhomboidal.
2. Ventrals as large as small dorsals, feebly keeled.
   Snout-vent length 65-67 mm, tail 70-75 mm.

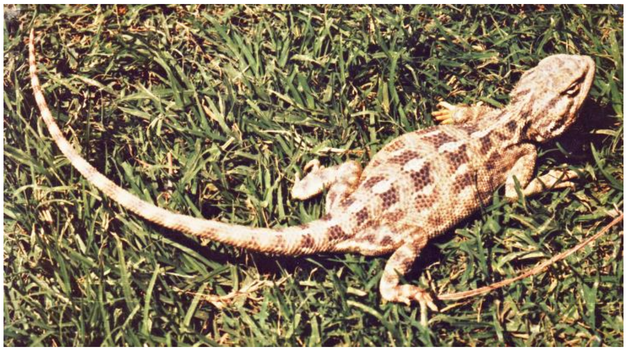


**Fig.6.23.** *Trapelus megalonyx* Günther.

*Colour*:
Dorsum metallic bronze in male, with a vertebral series of 6 large light dark-edged crossbars, enclosing a reddish ocellus. Throat cobalt blue, a dark streak along nape. Ventrum whitish with light mottling. Female pale gray to brown, with dorsal row of cross-bands enclosing dull orange ocelli edged with black. Throat and ventrum white.

*Habitat*:
Inhabits deserts with alluvial soil and little vegetation of grass and shrubs. Its burrows are located in the roots of shrubs and low thorny bushes. Diurnal, it becomes active 3-4 hours after dawn, feeding on insects and vegetation.
Reproductive activity is observed from March to May; 4-6 eggs are laid in burrows or under rock. Juveniles are seen from April to August.

*Range*:
It extends from to southern Afghanistan, Iran, Balochistan, the Sindh and Cholistan Desert in Punjab, Pakistan. It is collected up to an elevation of 1800 m.

### *25. Trapelus rubrigularis* Blanford
(**Figs. 6.24 & 6.22 B**)

1. Head scales unequal, keeled or granular, largest on snout. No spine on occiput.
2. Supralabials 16 to 18, forming denticulate upper lip.

3. Dorsals rhomboidal, imbricate, subequal, feebly keeled, scales intermixed with large, strongly keeled scales, arranged in more or less regular transverse rows.
4. Gular and ventral scales smooth, as large as the small dorsals. Gular sac slightly indicated in male.
5. Limbs weak, hind limb reaching occiput or ear.
6. Tail oval, covered with blunt tipped, subequal keeled scales.
7. Male with 1 or 2 rows of callose preanal scales.
   Snout-vent length 82-89 mm, tail 98-105 mm.

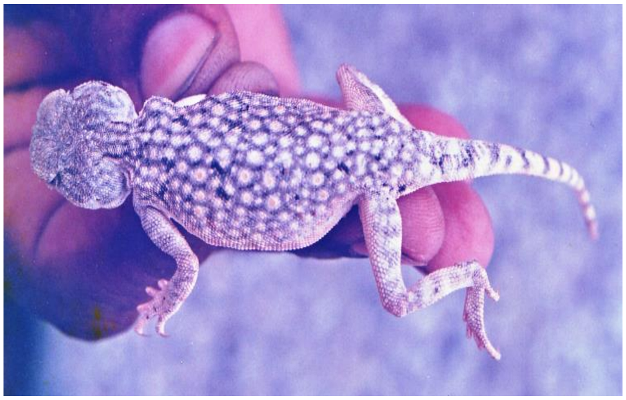


**Fig.6.24.** *Trapelus rubrigularis* Blanford.

*Colour*:
Dorsum olive or grayish, with small golden yellow spots at the center of each enlarged dorsal scale; juveniles with 3-4 dorsal series of black spots, persisting in some individuals throughout life. A dark streak from nape, ventrum whitish. In life, a large red spot on throat in both sexes.

*Habitat*:
The red-throat ground agama has been collected from flat desert with sparse grass and occasional thorny shrubs. When encountered in the open, it flattens its body, then sprints toward its burrow which lies at the roots of thorny bushes. Breeding season is quite extended from April to August, 4-6 eggs are laid in burrows. It is insectivorous and diurnal (Minton 1966).

*Range*:
The red-throat agama has been recorded from lower Sindh and coastal Balochistan.

### *26. Trapelus ruderatus baluchianus (*Smith)
**(Figs. 6.25 & 6.22B)**

1. Head with heterogeneous convex keeled scales; those at the back of the head spinose.
2. Supralabials 19, orally dentate.

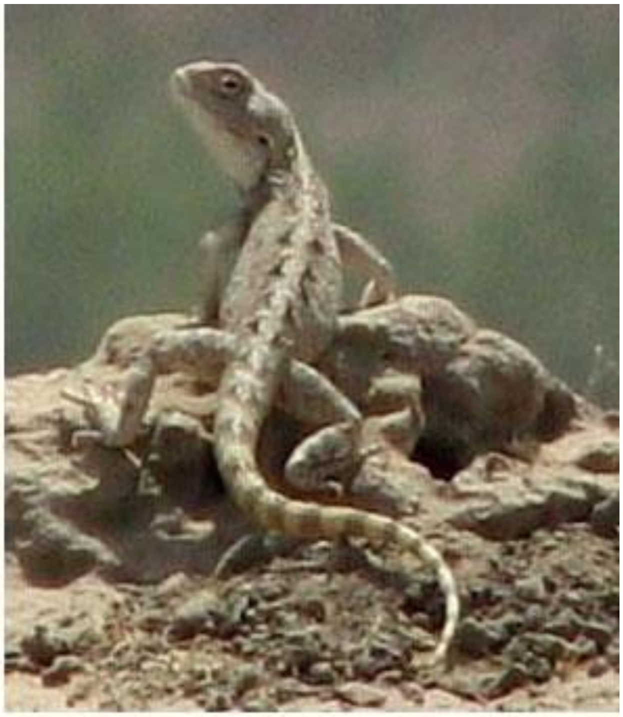


**Fig.6.25.** *Trapelus ruderatus baluchianus (*Smith).

3. Dorsals heterogeneous, rhomboidal, imbricate, with numerous large strongly keeled scales which are irregularly arranged, sometimes partially erect, all pointing more or less backward.
4. Flanks with backward and downward-directed small pointed scales.

5. Ventrals as large as laterals, smooth or feebly keeled.
6. Gulars as large as ventrals, no gular sac.
7. Hind limb reaches neck.
8. No strongly differentiated scales on neck and hind limb.
9. Tail round in transverse section, with subequal strongly keeled scales.
   Snout-vent length 75-80 mm, tail 100-106 mm.

*Colour*:
Dorsum grayish brown, ventrum pale, an indistinct dorsolateral series of paired dark brown spots.

*Habitat*:
This ground agama has been collected from semiarid rocky highland at elevations of 1800-2000 m. It is shy and sluggish, and lives in dense clumps of thorny vegetation, or under rocks. Breeding season extends from March to June; 6-10 eggs are laid. It is carnivorous, feeding on arthropods (Minton 1966).

*Range*:
The spotted ground agama has been recorded from Quetta and Sibi Districts in Pakistan.

## Family Chamaeleonidae

***Chamaeleo***
Head compressed, with an elevated median casque, with small, irregularly arranged scales; digits fused in two bundles. Single species.

### 1. ***Chamaeleo zeylanicus*** Laurenti
**(Fig.6.26)**

1. Head and body laterally compressed.
2. Prominent orbital and occipital ridges fusing posteriorly to form a casque.
5. Tail coiled ventrally.
6. Eyes protuberant, capable of independent movement.
   Snout-vent length 218-235 mm, tail 241-265 mm.

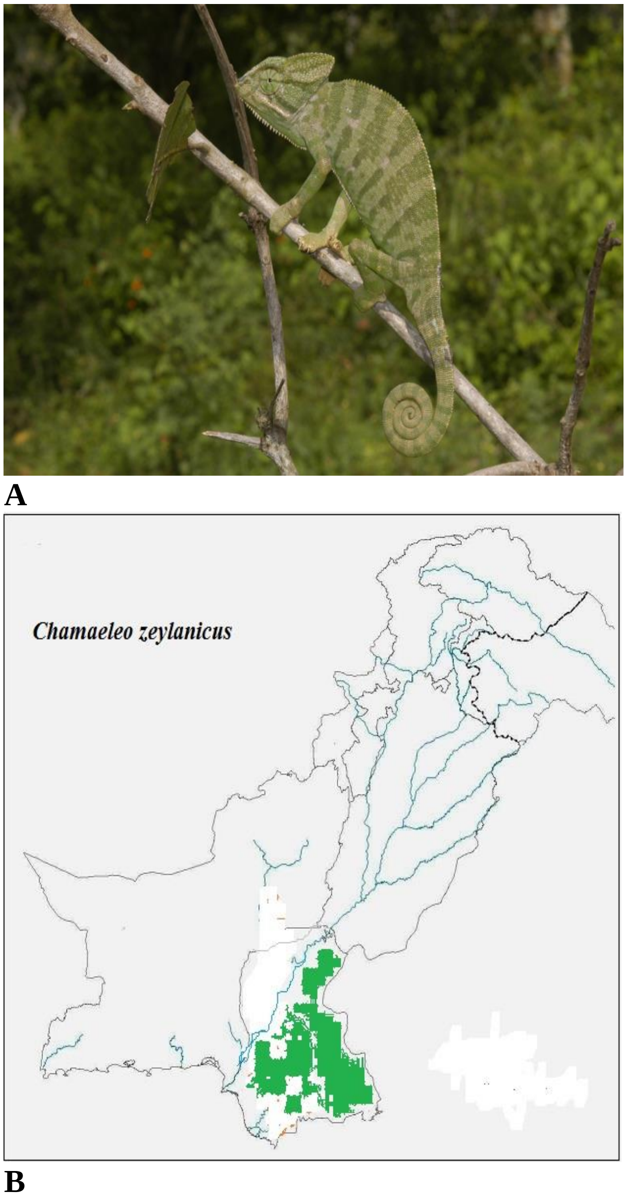


**Fig.6.26.** *Chamaeleo zeylanicus* Laurenti.

*Colour*:
Colour variable due to metachromatic changes. Usually dorsum pale yellow to dark olive, indistinct white or yellowish spots on sides, ventrum yellowish to greenish white, upper labials and enlarged midventrals ivory.

*Habitat*:

Inhabits thick jungles, bushy country, with mesic to moderate xerophytic environments. It is diurnal and completely arboreal, very clumsy on the ground. Branches are held firmly between clasping digits of hands and feet; the prehensile tail also helps in movements by holding on to the branches.

*Range*:

Wooded parts of peninsular India and Sri Lanka, extends into southeastern Sindh in Pakistan, where it is rare and local, does not extend beyond Sindh.

# APPENDIX

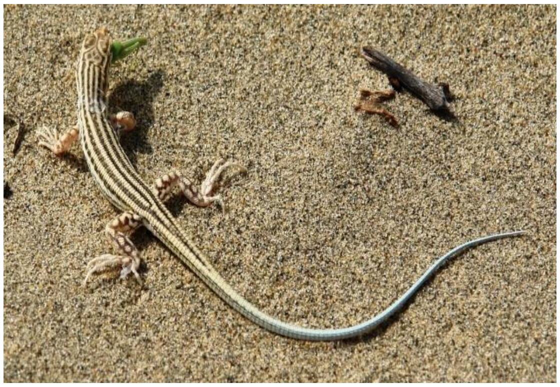
## Scientific, common English and Urdu names

| Scientific names | Common English | Roman Urdu | Urdu |
|---|---|---|---|
| **Family Agamidae** | **Agama** | ***Kirlay*** | کرّلے |
| *Brachysaura minor* (Hardwicke and Gray, 1827) | Short-tail Agama: | *Choti-dum kirla* | چھوٹی دُم کرلا |
| *Calotes versicolor versicolor* (Daudin, 1802) | Garden Lizard: | *Girgit* | گرگٹ |
| *Calotes versicolor farooqi* Auffenberg & Rehman, 1995 | Alpine Garden Lizard: | *pahari girgit* | پہاڑی گرگٹ |
| *Japalura kumaonensis* (Annandale, 1907) | Kumano Agama: | *Kumaon Krail* | کماؤن کرایل |
| *Laudakia agrorensis* (Stoliczka, 1872) | Agrore Valley Agama: | *Agror Wadi Kirla* | اگرور ویلی کرلا |
| *Laudakia badakhshana* (Anderson & Leviton, 1969) | Badkshan Agama | *Badkshani Kirla* | بدخشانی کرلا |
| *Laudakia caucasia* (Eichwald, 1831) | Caucasian Agama | *Koh-qaafi Kirla* | کوہ قافی کرلا |
| *Laudakia fusca* (Blanford, 1876) | Yellow-head Agama | *Zarad-sar kirla* | زرد سر کرلا |
| *Laudakia himalayana* (Steindachner, 1869) | Himalayan Agama: | *Himalayai Kirla* | ہمالائی کرلا |
| *Laudakia lirata* (Blanford, 1874) | Yellow Agama: | *Zarad Kirla* | زرد کرلا |
| *Laudakia melanura nasiri* Baig, 1999 | Spotted Agama | *Chittra Kirla* | چترا کرلا |
| *Laudakia melanura melanura* Blyth, 1854 | Black Agama | *Siah Kirla* | سیاہ کرلا |
| *Laudakia microlepis* (Blanford, 1874) | Small-scale Rock Agama | *chootay chanay wala Kirla* | چھوٹے چانے والا کرلا |
| *Laudakia nupta* (de Filippi, 1843) | Spiny Agama | *Khaar-sar Kirla* | خار سر کرلا |
| *Laudakia nuristanica* (Anderson & Leviton, 1969) | Nuristan Agama | *Nuristani Kirla* | نورستانی کرلا |
| *Laudakia pakistanica* (Baig, 1989) | North-Pakistan Agama | *Uttri-Pakistan Kirla* | اتری پاکستانی کرلا |
| *Laudakia pakistanica auffenbergi* Baig & Böhme, 1996 | Besham Agama | *Besham Kirla* | بشام کرلا |
| *Laudakia pakistanica khani* Baig and Böhme, 1996 | Chilas Agama | *Chilas Kirla* | چلاشی کرلا |
| *Laudakia tuberculata* (Hardwicke and Gray, 1827) | Blue Agama | *Neela Kirla* | نیلا کرلا |
| **Family Chamaeleonidae** | Chameleon | *Tajsar* | تاج سر گرگٹ |
| *Chamaeleo zeylanicus* Laurenti, 1768 | Ceylonese Chameleon: | *Taj-sar Girgit* | سیلونی تاج سر گرگٹ |

# Chapter 7

## Lacertidae

Family Lacertidae ......................................... 111
Description of Species .................................. 112



*Acanthodactylus blanfordii*

### Family Lacertidae

There are four genera of this family in Pakistan

1. Genus ***Acanthodactylus*** Wiegmann, 1834
   Occipital scale absent; nostrils between two nasals and first supralabial; lower eyelid scaly; collar distinct; dorsal scales small juxtaposed or large imbricate; ventrals subquadrangular, smooth, imbricate; digits subcylindrical, with keeled subdigital lamellae, lateral denticulations, at least on the outer side of toes; femoral pores present.
   Three acanthodactylid lizards are reported from Pakistan.

1. **Genus *Eremias*** Wiegmann, 1834
   Occipital scale vestigial or absent; nostril between 3-4 nasals, not touching supralabials; collar complete or nearly so; dorsal scales granular, subimbricate or juxtaposed; abdominal scales subquadrangular, imbricate, smooth in oblique converging longitudinal rows; digits with or without fringe of lateral scales; usually femoral pores present.
   Five species of eremiid lizards are reported from Pakistan.

2. **Genus *Mesalina*** Gray, 1838
   Occipital shield usually present; lower nasal scale in contact with first supralabial only; nostril between 3 nasals and is widely separated from supralabials; sometimes two or more transparent bodies in lower

eyelid; abdominal scales in parallel longitudinal rows.
Two species recorded from Pakistan

3. **Genus *Ophisops*** Ménétriés, 1832
Lower eyelid fused with upper, with a large transparent disc, covering the eye; collar weakly defined or absent in the middle; subdigital lamellae keeled; dorsal scales rhomboidal, imbricate, strongly keeled; femoral pores present.
Two species reported from Pakistan.

**Key:**

l. Naris in contact with first supralabial........2
Naris not in contact with first supralabial .....4
2. Dorsals scarcely larger than laterals; usually 7 light stripes on body; tail tip yellow ........... *Acanthodactylus micropholis*
Dorsals much larger than laterals; usually 6 stripes on dorsum; tail tip blue, gray, or pink ..........................................................3
3. Median dorsals and laterals are of almost equal size; middorsals 40-46 across midbody; gulars 18-20................................ .................. *Acanthodactylus blanfordii*
Median dorsals distinctly larger than laterals, 26-36; gulars 26 to 36 ................... ..................... *Acanthodactylus cantoris*
4. Eyelids immovable, forming spectacle; dorsals pointed, imbricate, and keeled; no collar.........................................................5
Eyelids movable, lower with transparent disc; dorsals granular, subimbricate or juxtaposed; collar present ........................6
5. Head scales rugose; 25 to 35 scales aroundz ........................... *Ophisops jerdonii*
Head scales smooth; 31-38 scales around the midbody .....................*Ophisops elegans*
6. Ventrals in straight longitudinal rows; an occipital scale present ...............................7
Ventrals in oblique longitudinal rows; occipital scale absent ................................8
7. Occipital scale in contact with interparietals; transparent scale in lower eyelid, edged with black.............................. ............................ *Mesalina watsonana*
Occipital scale not in contact with interparietals; transparent scale in lower eyelid not edged with black......................... ............................*Mesalina brevirostris*
8. Fringe of pointed scales distinct on the fourth toe ....................................................9
Fringe on the fourth toe absent................11
9. Fringe is only on the outer side of fourth toe.. ..................................... *Eremias scripta*
Fringe is on both sides of the fourth toe .........................................................10
10. Femoral pores present.....*Eremias acutirostris*
Femoral pores absent.....*Eremias aporosceles*
11. Dorsals 55 or more at midbody................... ....................................*Eremias persica*
Dorsals 50 or fewer at midbody.................. ...................................*Eremias fasciata*

### *1. Acanthodactylus blanfordii* Boulenger (**Fig.7.1**)

1. Lateral body scales a little smaller than those of middorsum.
2. Scales at midbody 28-46, gulars 32-38.
3. Hind limb reaches to ear or eye.
4. Femoral pores 21-29.
Snout-vent length 70-73 mm, tail 172-175 mm.

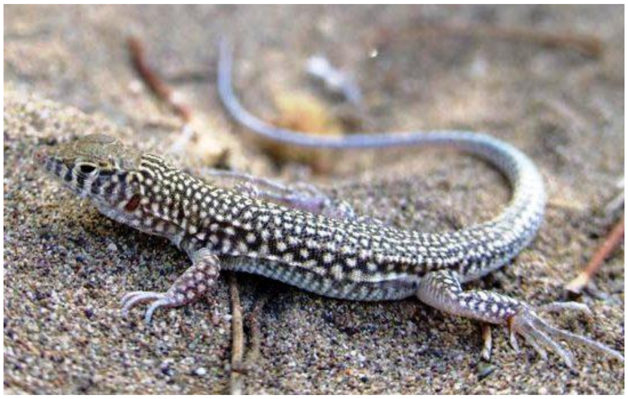


**Fig.7.1.** *Acanthodactylus blanfordii* Boulenger.

*Colour:*
Dorsum reddish brown to gray, speckled with white, traces of longitudinal stripes present; tail reddish gray. Ventrum white. Juveniles with 6 longitudinal yellow stripes on dark dorsum, extending onto the tail, tail distally pinkish.

*Habitat*:
The lizard frequents sand dunes, beaches, dry beds of water courses with sparse vegetation. It is diurnal, it keeping to the shade of vegetation at midday. In the afternoon, the lizard has a second brief spell of daily activity; however, at sunset it retreats into its burrow at the root of vegetation. It feeds on arthropods and their larvae. To escape capture, it runs from bush to bush instead of retreating into a burrow or under cover. It feeds on different kind of arthropods. The prey is quickly seized and, if of a larger size, is shaken and battered against the ground before taking in (Minton 1966).
It breeds from March to May and fights among breeding males are frequent; 2-6 eggs are laid in burrows and young are active by late April to July.

*Range:*
*Acanthodactylus blanfordii* is recorded from the western Balochistan and along the Makran coast, extending into southern Afghanistan.

### 2. *Acanthodactylus cantoris* Günther
(**Fig.7.2**)

1. Dorsals 26-36 across midbelly, gulars 26-38.
2. Hind limb reaches between ear and collar in male, between collar and axilla in female.
3. Femoral pores 16-23.
4. Subocular does not border mouth, separated from it by fifth and sixth supralabial.
   Snout-vent length 75-78 mm, tail 180-188 mm.

*Colour*:
Dorsum reddish brown to gray, speckled with white, often with traces of longitudinal stripes; tail bluish gray. Ventrum white. Young with 6 longitudinal yellow stripes on dark dorsum, extending onto tail, distal part of the tail blue.

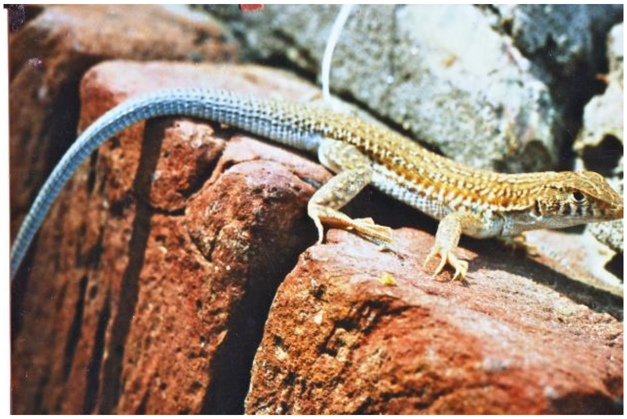


**Fig.7.2.** *Acanthodactylus cantoris* Günther.

*Habitat*:
Frequents sand fields with sparse vegetation of bushes and grasses. It burrows in roots of bushes where the sand is compact.

*Range:*
Wide ranging Saharo-Sindhian species from Saudi Arabia, Iraq, southern Afghanistan, and Iran, throughout the plains and deserts of Pakistan and India, from sea level to an elevation of 300 m. It is a common lizard along the beaches of Pakistani coastal areas.

### 3. *Acanthodactylus micropholis* Blanford
(**Fig.7.3**)

1. Lower eyelid scaly.
2. Dorsals in 43-54 rows, less than twice the size of the laterals.
3. Ventrals in 9-10 straight rows.
3. Gular scales 30-32 in a median row.
4. Femoral pores 40-43.
   Snout-vent length 62-65 mm, tail 125-130 mm.

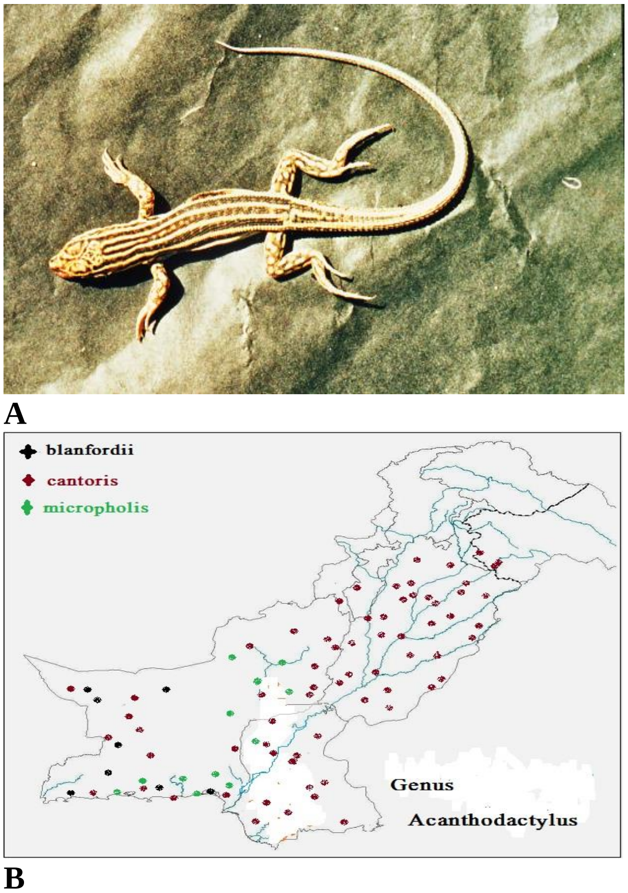


**Fig.7.3.** *Acanthodactylus micropholis* Blanford. B shows distribution of species of genes *Acanthodactylus* in different part s of Pakistan.

*Colour*:
Adult with seven bright yellow stripes separated by black or dark brown interstripe zones, lateral stripes are spotted with light; limbs grayish brown, spotted with yellow; tail bright yellow, ventrum white. Young similar to adult, but lack lateral spots on body.

*Habitat*:
Inhabits sandy places, stream beds with stones and sand.

*Range:*
From southeastern Iran along coastal Makran, Las Bela; northward it extends to central Balochistan.

### *4. Eremias acutirostris* (Boulenger) (**Fig.7.4**)

1. Dorsals granular, not enlarged on flanks.
2. Ventrals in 18-22, oblique longitudinal and 34-38 transverse rows.
3. Both fingers and toes with a well-developed fringe of flat pointed scales.
3. An occipital scale absent.
4. Femoral pores 22-30.
5. The subocular does not border the mouth. Snout-vent length 68-70 mm, tail 148-150 mm.

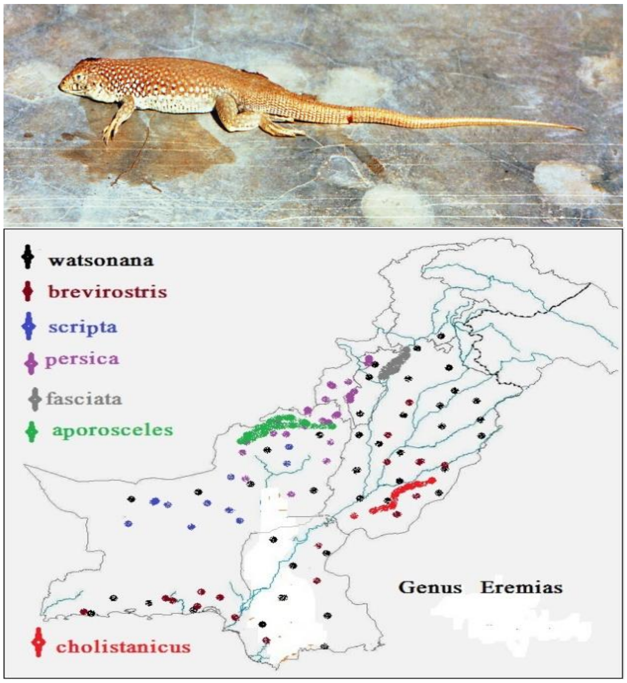


**Fig.7.4.** *Eremias acutirostris* (Boulenger). B shows distribution of all species of Genus *Eremias* in different parts of Pakistan.

*Colour*:
Dorsum light brown, with a fine reddish brown reticulum extending onto limbs, enclosing pale grayish spots. Ventrum pale yellow to white.

*Habitat*:
This desert lacerta is very agile on loose fine

sand dunes. When followed, it escapes by burrowing and tunnelling through the sand.

*Range:*
From desert basins of northwestern Balochistan and adjoining Afghanistan and Iran.

### ***5. Eremias aporosceles*** (Alcock and Finn)
(**Fig.7.4B**)

1. Femoral pores absent.
2. Fringe of pointed scales on both sides of fourth toe.
3. Gular scales 28-33.
4. Dorsals granular, subequal, 68-82 across mid-dorsum.
5. Ventrals in 18-20 longitudinal, and 34-36 transverse series.
   Snout-vent length 78-80 mm, tail 135-140 mm.

*Colour*:
Dorsum sandy gray, with dark reticulation, head with symmetrical dark markings. Ventrum white.

*Habitat*:
Frequents sand fields with sparse marginal vegetation, also extending into sandy rocky country.

*Range:*
Recorded from around Koh Malik-do-Khand, at the Afghanistan-Pakistan border.

### ***6. Eremias cholistanicus*** Baig & Masroor
**(Figs.7.5 & 7.4B)**

1. Dorsal at midbody 51-63.
2. Ventrals across midabdomen 13-15.
3. Subocular in mouth.
4. A row of granules separate supraciliaries from supraoculars. Occipital absent.
5. 14-18 femoral pores, separated by 2-4 scales.

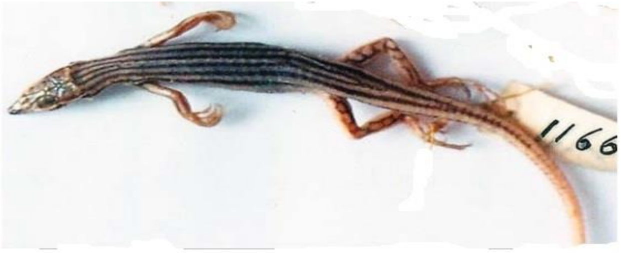


**Fig.7.5.** *Eremias cholistanicus* Baig & Masroor.

*Colour*:
Dorsum light with 6-7 dark stripes running to tail dorsum.

*Range:*
Bahawalpur, southern Punjab, Pakistan.

### ***7. Eremias fasciata*** Blanford
(**Figs.7.6 & 7.4B**)

1. Ventrals in oblique longitudinal rows.
2. No fringe of scales on fourth toe.
3. No occipital scale.
4. Number of dorsal scale rows at midbody 44-50.
5. Caudal scales strongly keeled.
6. Femoral pores 15-18.
   Snout-vent length 63-65 mm, tail 120-124 mm.

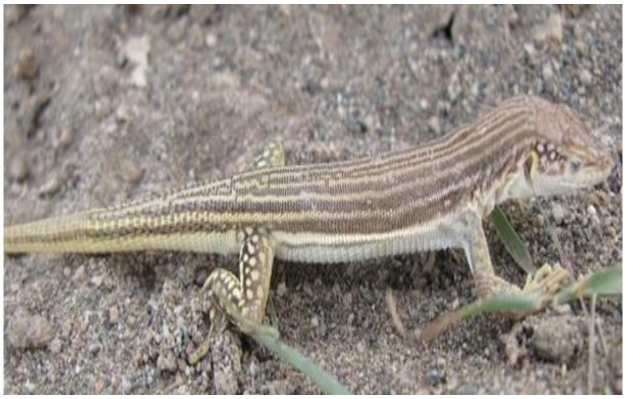


**Fig.7.6.** *Eremias fasciata* Blanford.

*Colour*:
Dorsum pale gray to sandy, with 5-9 narrow dark, longitudinal streaks on neck, reduced to 5-

7 on back. A lateral stripe from eye to supraocular region, another along outer margin of the ventrals. Ventrum white.

*Habitat*:
The lizard inhabits sandy plains with bushes. Diurnal, it feeds on various types of desert arthropods.

*Range:*
It ranges from Iran, Afghanistan and Balochistan up to southern Waziristan, Dera Ismael Khan.

### ***8. Eremias persica*** (Blanford)
(**Figs.7.7 & 7.4B**)

Largest and most robust of all Pakistani lacertids.

1. Interparietal is longer than the suture between parietals.
2. No fringe of scales along outer border of fourth toe.
3. Large supraoculars 2.
4. Caudals keeled, arranged in annuli.
   Snout-vent length 95-98 mm, tail 150-152 mm.

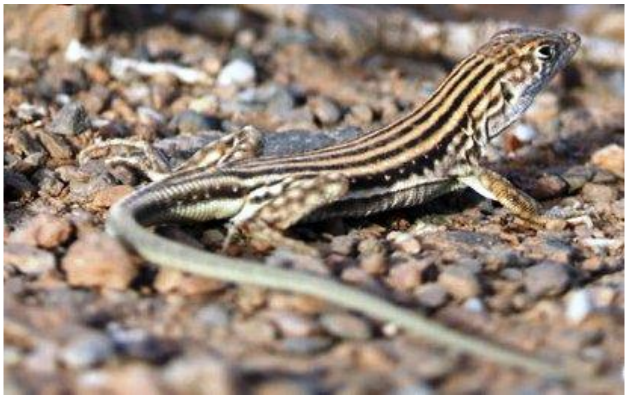


**Fig.7.7.** *Eremias persica* (Blanford).

*Colour*:
Adult with grayish brown dorsum, a wide irregular black or dark brown stripe from shoulder to the base of tail. Additional pale gray, or white and dark markings and spots are arranged in longitudinal rows. Limbs with indistinct light spots. Distal half of tail bluish.

*Habitat*:
Inhabits scrubby and sparse grassland habitat with sandy substratum, clearly avoiding open sand dunes. Running at great speed from one clump of bushes to another is the characteristic behavior of this lizard.

*Range:*
Confined to the northern Iran. In Pakistan it is reported from northern Waziristan, Quetta, and Nushki.

### ***9. Eremias scripta*** (Strauch)
(**Figs.7.8 & 7.4B**)

1. Fringe of large scales only on outer border of fourth toe.
2. Ventrals in 14-16 oblique longitudinal and 32-34 transverse series.
3. An occipital scale present.
   Snout-vent length 58-60 mm, tail 128-130 mm.

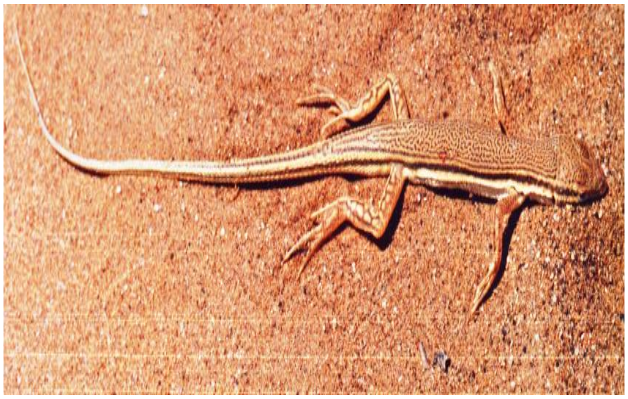


**Fig.7.8.** *Eremias scripta* (Strauch).

*Colour:*
Dorsum yellowish to golden brown, becomes pale bluish gray on tail, with 5-7 fine dark

stripes, some of which are vermiculate. Sides and ventrum of the body cream to white.

*Habitat*:
The vermiculated lacerta inhabits flat fields of loose fine sand, with sparse vegetation of small herbs and grasses. The lizard is very active during the early and late hours of the day.

*Range:*
The vermiculate lacerta extends from Transcaspia to eastern Khazakistan, Iran, Afghanistan and northern Balochistan, to east of Nushki.

### *10. Mesalina brevirostris* Blanford
(**Fig.7.9**)

1. Occipital separated from the interparietals.
2. Ventrals in 10-12 straight longitudinal series, median 4 rows distinctly broader than long.

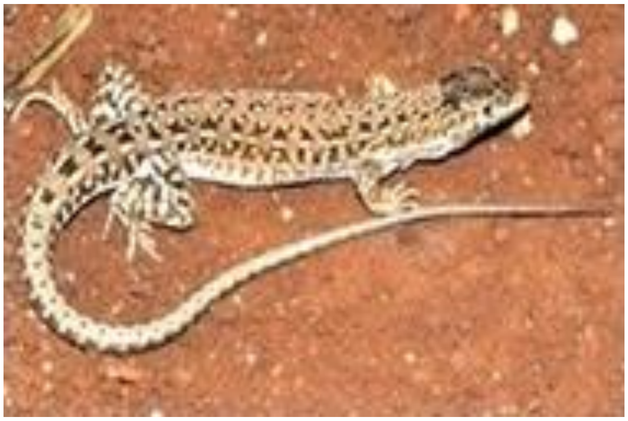


**Fig.7.9.** *Mesalina brevirostris* Blanford.

3. Lower nasal scale rests on first supralabial only.
4. An occipital scale present.
5. No fringe of scales on digits.
   Snout-vent length 56-58 mm, tail 95-98 mm.

*Colour*:
Grayish brown dorsum with numerous white and black spots which are largest and more closely arranged on sides.

*Habitat*:
Hard alluvial soil close to sand dunes, where vegetation is sparse in the form of clumps of thorny bushes and reeds. The lizard moves quickly from one clump to another.

*Range*:
Reported from District Mianwali, in northwestern Punjab, and coastal Las Bela. It has extensive Range in the west to Syria.

### *11. Mesalina watsonana* (Stoliczka)
(**Fig.7.10**)

1. Ventrals distinctly broader than long, in 8-10 straight longitudinal series across midabdomen.
2. Occipital scale in contact with the interparietal.
3. Lower nasal scale rests only on first supralabial.
4. No lateral fringe on fourth toe.
5. Dorsal and lateral scales of body granular.
   Snout-vent length 60 mm, tail 124 mm.

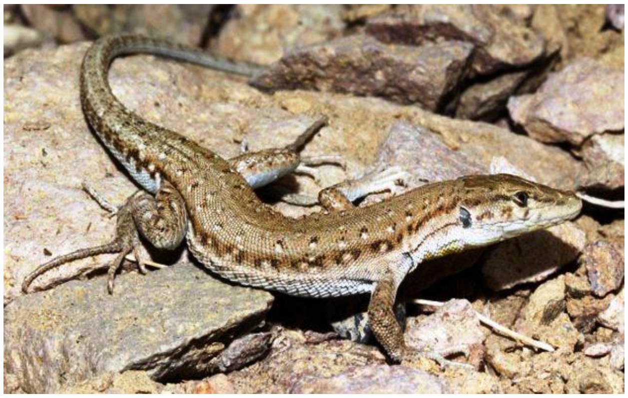


**Fig.7.10.** *Mesalina watsonana* (Stoliczka).

*Colour*:
Grayish to olivaceus dorsum, usually 2 pairs of indistinct light longitudinal stripes. Middorsum

with longitudinal series of small white spots which are edged with black. Limbs with faint light spots. Ventrum white to yellowish.

*Habitat*:
Prefers flat fields of hard soil, where the vegetation of herbs and grasses is sparse. It particularly avoids soft loose sandy soil.

*Range*: From Rajputana to southern Afghanistan, and Iran. In Pakistan it occurs throughout the plains, excluding the deserts. It extends from sea level to 2000 m of elevation.

### *12. Ophisops elegans* Ménétriés
(**Fig.7.11**)

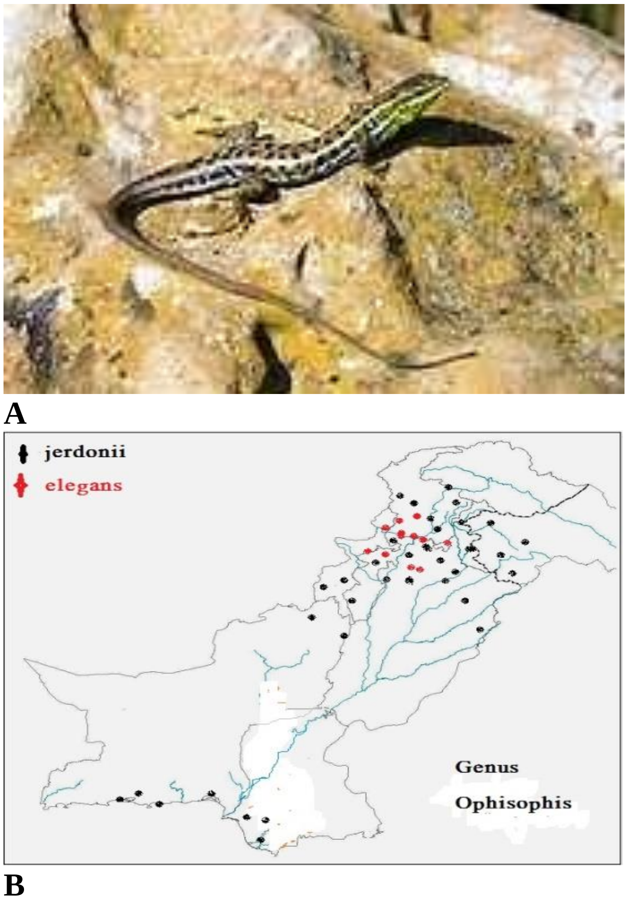


**Fig.7.11.** *Ophisops elegans* Ménétriés. B shows distribution of species of Genus *Ophisops* in different parts of Pakistan.

1. Head scales smooth.
2. Scales around midbody 31-38 scales.
3. Femoral pores 10-12 on each side.

   Snout-vent length 55-58 mm, tail 102-107 mm.

*Colour*:
Olive greenish or brownish dorsum, with a pair of light dorsolateral stripes; first originating from the supraciliary margin; second from below eye, passing through ear, along body flanks to hind limb. Upper stripe dorsally spotted with black. A series of vertebral spots. Ventrum greenish white.

*Habitat*:
Gullied scrubland, with sparse vegetation of low grasses, reeds, and thorny bushes. The lizard lives in crevices and holes in soil and moves very fast from one shelter to another.

*Range*:
Reported from Mianwali District and Waziristan hilly tracts. However, it has wider Range in the west, extending to the Caspian region and west to Turkey and the Levant.

### *13. Ophisops jerdonii* Blyth
(**Figs.7.12 & 7.11B**)

1. Head scales rugose, with strong striations.
2. Scales around mid body 28-35 scales.
3. Femoral pores 7-12, on each side.

   Snout-vent length 47-49 mm, tail 95-98 mm.

*Colour*:
Olive brown, golden or greyish above, with a pair of golden lateral streaks, upper one extending from supracilliaries to tail, lower bordering upper lip and extending along body flanks to the base of the hind limb. The space between stripes, as well as the upper border of the upper stripe, usually spotted with black. Ventrum yellowish brown.

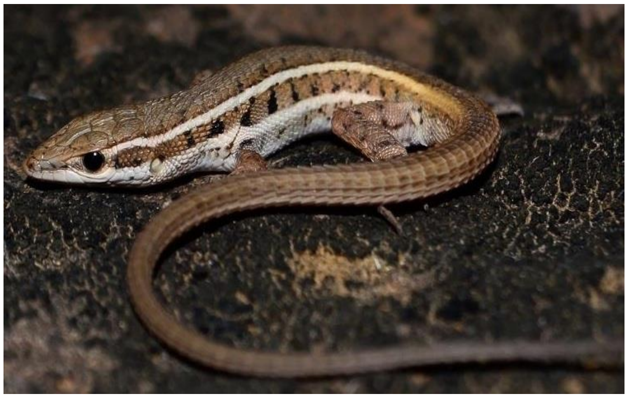


**Fig.7.12.** *Ophisops jerdonii* Blyth.

*Habitat*:
It is common in the leaf litter, and inhabits moist environs of shady places in gardens, forests, grasslands, and the areas with much ground cover.

*Range*:
Widely distributed lizard in the plains and semi-hilly regions throughout Pakistan and India. In Pakistan it has been recorded apart from various localities in the Punjab and Sindh plains, from alpine Punjab, Salt Range, Waziristan, Quetta, and Khuzdar in Balochistan.

# APPENDIX

## Scientific, common English and Urdu names

| **Scientific names** | **Common English** | **Roman Urdu** | **Urdu** |
|---|---|---|---|
| Family Lacertidae | Sand lizards | *Taiz-rao, ChalpayAy* | تیزرو، چلپائے |
| *Acanthodactylus blanfordii* Boulenger, 1918 | Red-tail Sand Lizard | *Surakh-dum Taiz-rao* | سرخ دم تیزرو |
| *Acanthodactylus cantoris* Günther, 1864 | Blue-tail Sand Lizard | *Neeli-dum Taiz-rao* | نیلی دُم تیزرو |
| *Acanthodactylus micropholis* Blanford, 1874 | Yellow-tail Sand Lizard | *Peeli-dum Taiz-rao* | زرد دم تیزرو |
| *Eremias acutirostris* (Boulenger, 1887) | Lesser Reticulate Sand Lizard | *Patti-dar Taiz-rao* | پٹی دار تیزرو |
| *Eremias aporosceles* (Alcock & Finn, 1896) | Greater Reticulate Sand Lizard | *Jal-dar Taiz-rao* | جالدار تیزرو |
| *Eremias fasciata* Blanford, 1874 | Striped Sand Lizard: | *Patti-dar Taiz-rao* | دھاری دار تیزرو |
| *Eremias persica* Blanford, 1874 | Persian Sand Lizard | *Irani Taiz-rao* | ایرانی تیزرو |
| *Eremias scripta* (Strauch, 1867) | Vermiculate Sand Lizard | *Noushki Taiz-rao* | نوشکی تیزرو |
| *Mesalina brevirostris* Blanford, 1874 | Short-snout Sand Lizard | *kota-sar Taiz-rao* | کوتہ سر تیزرو |
| *Mesalina watsonana* (Stoliczka, 1872) | Spotted Sand Lizard | *Chittra Taiz-rao* | چترا تیزرو |
| *Ophisops elegans* Ménétriés, 1832 | Smooth Spectacled Sand Lizard | *Naram samp-chishm Taiz-rao* | نرم سانپ چشم تیزرو |
| *Ophisops jerdonii* Blyth, 1853 | Rugose spectacled sand lizard | *Khurdra samp-chishma Taiz-rao* | کھردری سانپ چشم تیزرو |

# Chapter-8

## Scincidae

Family Scinidae ............................................ 121

*A Scincid*

### Family Scincidae

There were eight genera of this family in Pakistan

1. **Genus *Ablepharus*** Fitzinger, 1823
   No supra-anal shields; eyelids fused with each other forming transparent spectacle covering the eye; ear opening reduced in size or absent. Limbs pentadactyl, weakly developed; body with smooth cycloid scales, in 18-26 rows around midbody,
   Two species known from Pakistan.

2. **Genus Chalcides** Laurenti, 1768
   Nostril between nasal and rostral; supranasals present; prefrontals and frontoparietals absent; lower eyelid with a transparent disc; body elongate, cylindrical; limbs reduced or vestigial.
   Single species known from Pakistan.

3. **Genus *Eurylepis*** Blyth, 1854
   Limbs relatively slender, lamellae not expanded. Head somewhat conical. Head scales shiny, separated by shallow sutures. Two loreals, followed by two presuboculars. Postnasal scales present. Palbebral scales and superciliaries not separated by groove. Four or five pairs of nuchal scales, followed by several pairs of broadened mid-dorsal scales and broad row

of fused mid-dorsal scales. Large median preanal scales overlie small lateral pair. Ear lobules conspicuous, but not covering ear opening. Color pattern consists of gray-brown background, with pale, broad dorsolateral stripes, more distinct anteriorly, brown rectangular spots dominating posteriorly.”

A single species known from Pakistan.

**4. Genus *Lygosoma*** Hardwick & Gray, 1827

Naris piercing nasal scale; supranasal scale present; dorsals uniform in size; body and tail elongated; limbs short vestigial, pentadactyl, clawed.

A single species represented in Pakistan.

**5. Genus *Eutrophis*** Fitzinger, 1843

Eyelids moveable, lower with or without a transparent disc; ear opening distinct, tympanum deeply sunk; nostrils piercing single nasal scale; supranasals and prefrontals shields are present. Limbs well developed, pentadactyl, digits subcylindrical or compressed with transverse subdigital lamellae.

Two species are reported from Pakistan.

**6. Genus *Novoeumeces*** Griffith, Ngo, and Murphy, 2000)

Relatively heavy limbs with robust pes, expanded subdigital lamellae. Head scales thick, separated by deep sutures. Two loreals, followed by two presuboculars. Postnasal absent. Palbebral scales separated from superciliary scales by deep groove containing small granular scales. Three or four pairs of nuchal scales. Ear lobules conspicuous, but ear opening not fully covered. Two mid-dorsal scale rows broadened, not fused. Medial preanal scales overlie lateral preanal scales, Color pattern usually consisting of small spots, broken longitudinal stripes or irregular narrow bars on brown or olive background.

Three species are recorded from Pakistan.

**7. Genus *Ophiomorus*** Duméril and Bibron, 1839

Eyes small; eyelids reduced, lower eyelid with a transparent disc; ear opening absent or hidden; naris in a suture between nasal and supranasal, close to rostral; prefrontals, frontoparietal and parietal are distinct; body elongate, serpentine, with weak limbs and reduced digits, limbs may be absent.

Four species are reported from Pakistan.

**8. Genus *Scincella*** Mittleman, 1950

Body rather short, not markedly serpentine; eyelids moveable; a supranasal scale absent; limbs more or less strong, pentadactyl, clawed.

Two species known from Pakistan.

**Key:**

1. Body serpentine; limbs short and vestigial ......................................................2
   Body not markedly serpentine; limbs well developed ....................................................5
2. Fingers 4; toes 3 .........................................3
   Fingers and toes 3 ......................................4
3. Scale rows at midbody 20 ............................ ...........................*Ophiomorus blanfordi*
   Scale rows at midbody 22. ........................... ........................... *Ophiomorus brevipes*
4. Parietals in contact with anterior temporal .........................*Ophiomorus tridactylus*
   Parietal and anterior temporal separated by posterior temporal .....*Ophiomorus raithmai*
5. Eyelids fused to form spectacles................6
   Eyelids movable.........................................7
6. Ear hidden beneath scales ............................ ............................ *Ablepharus grayanus*
   Ear opening small but distinct .........................*Ablepharus pannonicus*
7. Supranasal scale present.............................8
   Supranasal scale absent..............................9
8. Scales of middorsal rows much wider

than laterals ............................................ 10
Scales of dorsal side of body equal in size throughout ............................................ 13

9. Scales at midbody 24-30........ ............................*Scincella himalayana*
Scales at midbody 32-36............................. ............................ *Scincella ladacensis*

10. Broad dorsals in a single row ............................*Eurylepis taeniolatus*
Broad dorsals in a double row ................. 11

11. Middorsals 26-30; dorsum uniform brown or with 3 more or less distinct dark stripes ...................................................... 12
Middorsals 52-56; 5-7 dark brown dorsal stripes ...............*Novoeumeces indothalensis*

12. Dorsum uniform brown or with three more or less distinct dark stripes.................................. .......*Novoeumeces (schneiderii) zarudnyi*
Dorsum pale gray, vermilian stripes from temporal to groin, scattered orange scales on body ................ *Novoeumeces blythianus*

13. Naris piercing nasals............................... 14
Naris between nasals and rostral ...............................*Chalcides ocellatus*

14. Limbs well developed, pentadactyl ......... 15
Limbs short and vestigial............................ ...............................*Lygosoma punctata*

15. Supranasals in contact with each other; dorsals with 3 keels..................................... *Eutrophis dissimilis* Supranasals separated from each other, dorsals with 3-7 keels ....... ............................*Eutrophis macularia*

### *1. Ablepharus grayanus* (Stoliczka)

(**Fig.8.1**)

1. Ear opening obscure, position indicated by a shallow depression.
2. Scales around the midbody 18-20.
Snout-vent length 32-33 mm, tail 54-58 mm.

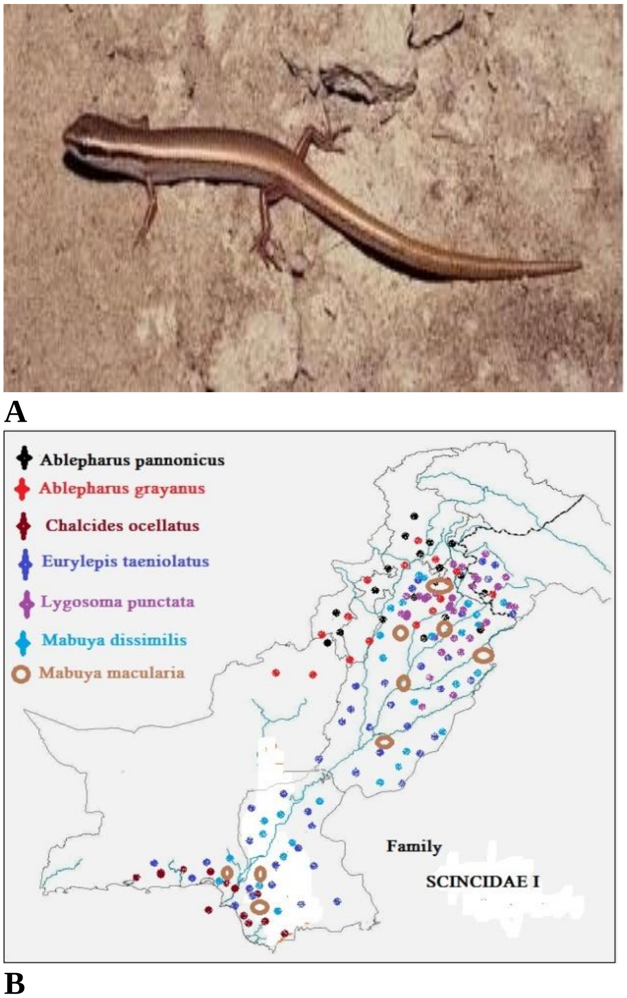


**Fig.8.1.** *Ablepharus grayanus* (Stoliczka). B shows distribution of different genera of family Scinidae in different parts of Pakistan.

*Colour*:
Body olive greenish with distinct metallic luster, flanks speckled or streaked with dark brown. A light stripe from superciliary edge to the base of tail, edged above and below with black.

*Habitat*:
Frequents leaf litter and prostrate vegetation, inhabits the moist environs under fallen leaves in gardens and oases, grasslands, backyard gardens, and extend into the inhabited houses.

*Range*:
Recorded from throughout Pakistan at low elevations, especially grass fields in the Indus

riparian system. It has also been recorded from hills around Fort Munro, Dera Ghazi Khan at an elevation of 1800 m.

### *2. Ablepharus pannonicus* (Fitzinger)

(**Figs.8.2 & 8.1B**)

1. Small distinct ear opening, partially hidden by scales.
2. Number of scales around midbody 20, rarely 22.
   Snout-vent length 40-55 mm, tail 100-120 mm.

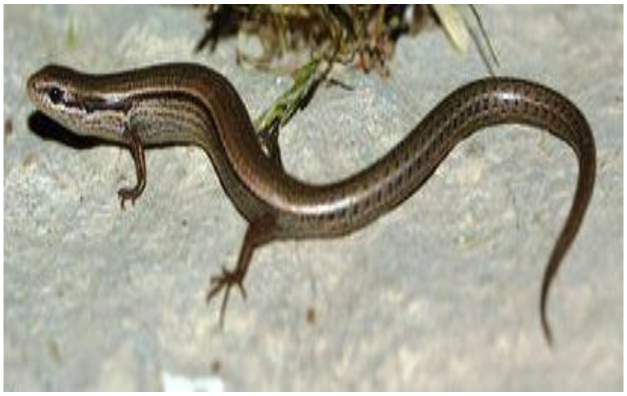


**Fig.8.2.** *Ablepharus pannonicus* (Fitzinger).

*Colour*:

Olive brown dorsum with metallic luster. A distinct dark brown dorsolateral stripe, edged above with white. Flanks with indistinct dark longitudinal lines. Supralabials cream, chin and throat whitish, flecked with blue, ventrum pale bluish gray; limbs and tail tinged with red.

*Habitat*:

Inhabits stony hillsides, with thick growth of low grasses and herbs, under fallen needles of pine trees at an elevation of 2000 m. Its slippery body and small size make it difficult to capture.

*Range*:

From the Arabian Peninsula and North Arabian Desert, through Iran to circum-Mediterranean region, Tajikistan and Afghanistan. In Pakistan it has been reported from around Quetta, Waziristan hills, Chitral and the Salt Range.

### *3. Chalcides ocellatus* (Forskål)

(**Figs.8.3 & 8.1B**)

1. Naris between nasal and rostral scales.
2. Supranasal scale present.
3. Prefrontal and frontoparietal scales absent.
4. Limbs short, pentadactyl.
   Snout-vent length 105-115 mm, tail 70-75 mm

*Colour*:

Dorsum bronze, sides pale yellow; dark scales are arranged in irregular transverse rows on body, in more regular annuli on tail. Each dark scale has a median light bar. Head is speckled with dark. Labials cream with dark bars.

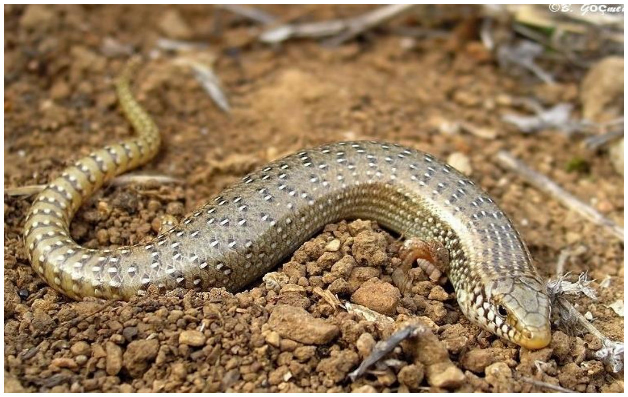


**Fig.8.3.** *Chalcides ocellatus* (Forskål).

*Habitat*:

Warm humid areas with scrubby vegetation, in rocky and sandy terrain. It is secretive in habits. Viviparous, it gives birth to 4-6 young ones.

*Range*:

From the Mediterranean through northern Saudi Arabia, the Persian Gulf to the Makran coast. In Pakistan it has been recorded from along the coastal strip, around Karachi and Astola Island.

### *4. Eurylepis schneideri* Daudin
(**Fig.8.4**)

1. Second supraocular larger than first.
2. Fromto-parietal in contact with each other, much smaller than nterparietals, which completely separate the prietals.
3. 3-5 pairs of nuchals.
4. Nasal large, no postnasal.
5. Anterior loreal higher than long, smaller than posterior loreal, in contact with supranasal.
6. Ear opening with 3-4 large pointed lobules interiorly.
7. 26-30 scales round midbody, two median dorsal rows distinctly broader than laterals.
8. 58-62 dorsal scales in longitudinal series.
   Snout-vent 170; tail 200 mm.

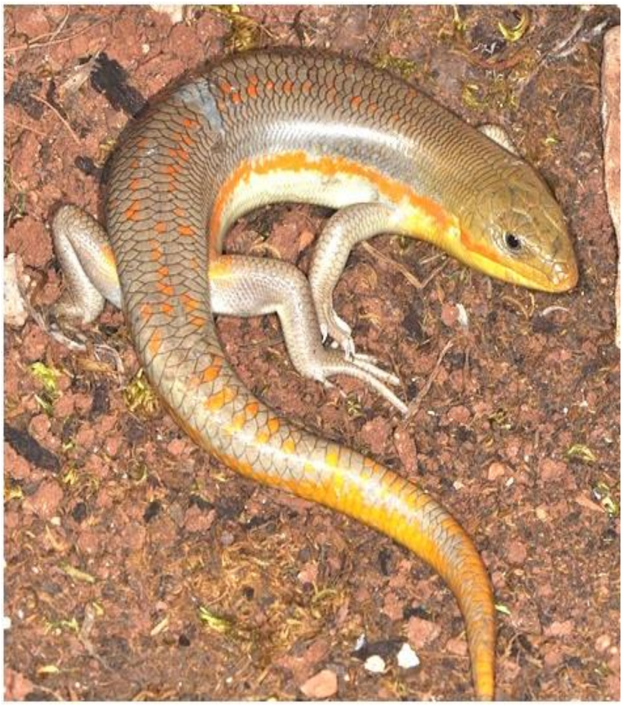


**Fig.8.4.** *Eurylepis schneideri* Daudin.

*Colour*:
Young olive-grey or brownis, uniform or wih three more or less distinct dark stripes or with golden spots or stripes. Abdomen yellowish-white.

*Range*:
Makrsan coast, northern Balochistan, Waziristan, asia mirror Persia, Arabia to north transcaspia.

### *5. Eurylepis taeniolatus* (Blyth)
(**Figs.8.5 & 8.1B**)

1. Number of scales round midbody 21-23.
2. A postnasal scale present.
3. Two median rows of dorsal scales fused into a broad median row.
   Snout-vent length 160-165 mm, tail 299-225 mm.

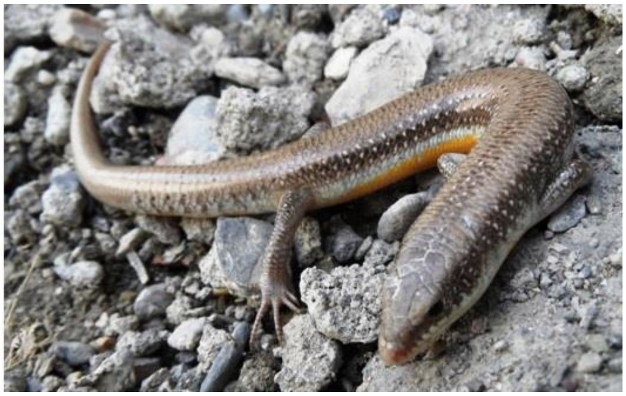


**Fig.8.5.** *Eurylepis taeniolatus* (Blyth).

*Colour*:
Dorsum pale sandy to bronze, speckled with cream. Three dark brown stripes with scattered light flecks run on the body. Tail speckled and variegated black, brown, and pale gray. Ventrum vivid yellow. In juvenile each yellow scale is edged with black, and there is no stripe on the dorsum.

*Habitat*:
Inhabits loose sandy soil or loamy with scrubby vegetation, in almost deserticolous habitat, mostly close to water courses.

*Range*:
Reported from Arabia to the Transcaspia, Kutch, and Sindh to Kashmir. In Pakistan it has been collected from throughout the plains of Punjab and Sindh to an elevation of 2000 m.

### *6. Lygosoma punctata* (Linnaeus)
(**Figs.8.6 & 8.1B**)

1. Lower eyelid with undivided transparent disc.
2. Fingers and toes 5.
3. Number of scales around the midbody 24-28.
4. Tail longer than body.
   Snout-vent length 85-91 mm, tail 120-139 mm.

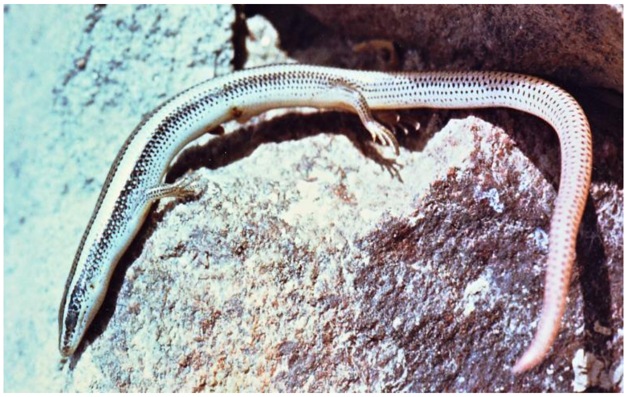


**Fig.8.6.** *Lygosoma punctata* (Linnaeus).

*Colour*:
Body brown, each body scale with a dark basal spot. In juvenile there are 4-6 longitudinal stripes down the back. A canthal yellowish streak strongly marked in young. Ventrum uniform yellowish white or each scale with a dark central mark. Tail reddish.

*Habitat*:
Inhabits grass fields with moderate moisture and shade, ideally available in gardens and orchards and around big cities. This skink is common in the lawns of large buildings around Lahore, where it extends into backyards of houses and often comes to live under household articles. It slips from one object to another and is difficult to catch.

*Range*:
Wide range in the Indo-Gangetic plains, from Bangladesh through India and Sri Lanka. In Pakistan, it is restricted to the eastern strip of Punjab plain, northward it extends into Hazara Division.

### *7. Eutrophis dissimilis* (Hallowell)
(**Fig.8.7**)

1. Supranasals in contact with each other.
2. Frontonasal almost as broad as long.
3. No potnasal scale.
4. An undivided transparent disc in lower eyelid.
5. Dorsal and lateral body scales subequal.
6. Dorsals with 2 or 3 laterals with 3 keels.
   Snout-vent length 53-55 mm, tail 69-70 mm.

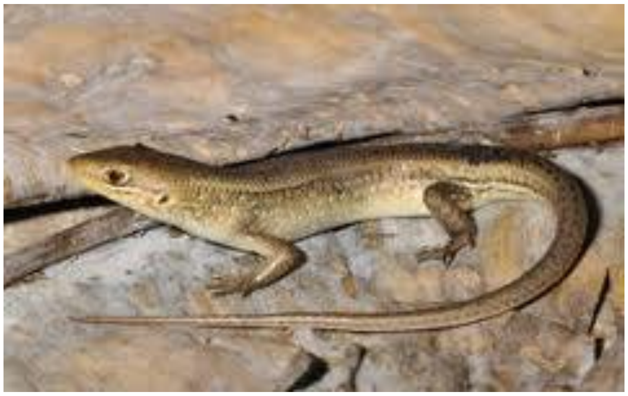


**Fig.8.7.** *Eutrophis dissimilis* (Hallowell).

*Colour*:
Dorsum light brown, with 3 or more greenish white stripes, a median dorsal and 2 dorsolateral; stripes are edged with transversely arranged black spots. The sides of the body are spotted with white dark-edged spots. Ventrum yellowish white. Eyelids edged with bright yellow.

*Habitat*:

Inhabits open moist grass fields and extends in tilled land where it is killed into large numbers, as people commonly believe it to be a “deadly poisonous legged snake".

*Range*:

From western Bengal, Bihar, across the Gangetic plain to Rawalpindi, upper Indus Valley to Waziristan, and extends into the Indus Delta.

### 8. *Eutrophis macularia* (Blyth)

(**Fig.8.8**)

1. Supranasals are separated from each other.
2. Frontonasals about as long as broad.
3. A postnasal may or may not be present.
4. Scaly lower eyelid.
5. Dorsal and lateral body scales are subequal, with 5-9 keels.
   Snout-vent length 68-70 mm, tail 63-65 mm.

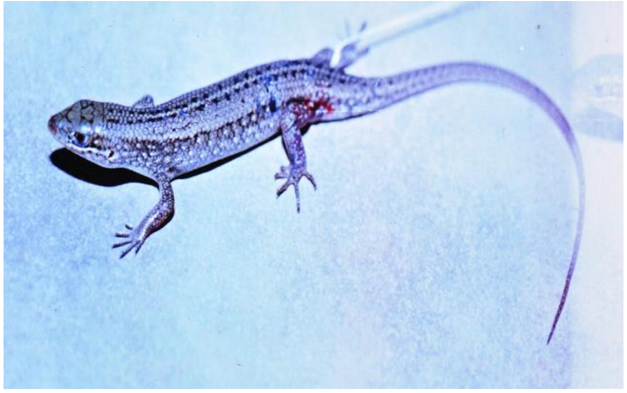


**Fig.8.8.** *Eutrophis macularia* (Blyth).

*Colour*:

Dorsum uniformly iridescent bronze, or specked with black. Sides of body darker, with rows of white dots. Female brown to gray, with sparse light dots, or dots may be absent. Ventrum white. Male with vermilion lips and flanks during breeding season.

*Habitat*:

A human commensal, inhabiting grasslands, open fields, farmlands, and parks and gardens close to human habitations, seldom venturing in buildings.

*Range*:

From Laos and Cambodia to northern Malaya, Myanmar, western Bengal, and Bihar, across the Indo-Gangetic Plain, to the Iranian Plateau. In Pakistan it has been reported from the plains and highland of the Salt Range, in Punjab, around Karachi and Las Bela.

### 9. *Novoeumeces blythianus* (J. Anderson)

(**Fig.8.9**)

1. A single azygous postmental.
2. Nuchals 2- 4 pairs.
3. Number of scales round the midbody 28-30.
   Snout-vent length 85-89 mm, tail 149-154 mm.

*Colour*:

Dorsum pale gray, with vermilion stripes from temporal to the groin, tail vermilion to orange. Body and back with scattered orange scales, lips and chin chrome yellow, ventrum white.

*Habitat*:

Inhabits rocky to hard soil terrain with low vegetation.

*Range*:

From coastal areas of Pakistan. It has also been reported from near the Khyber Pass in northwestern Pakistan, close to the Afghan border.

### 10. *Novoeumeces indothalensis*

(M. S. Khan and M.R.Z. Khan)

(**Figs.8.10 & 8.9B**)

1. Dorsal pattern of 5-7 dark brown stripes, extending onto the tail.

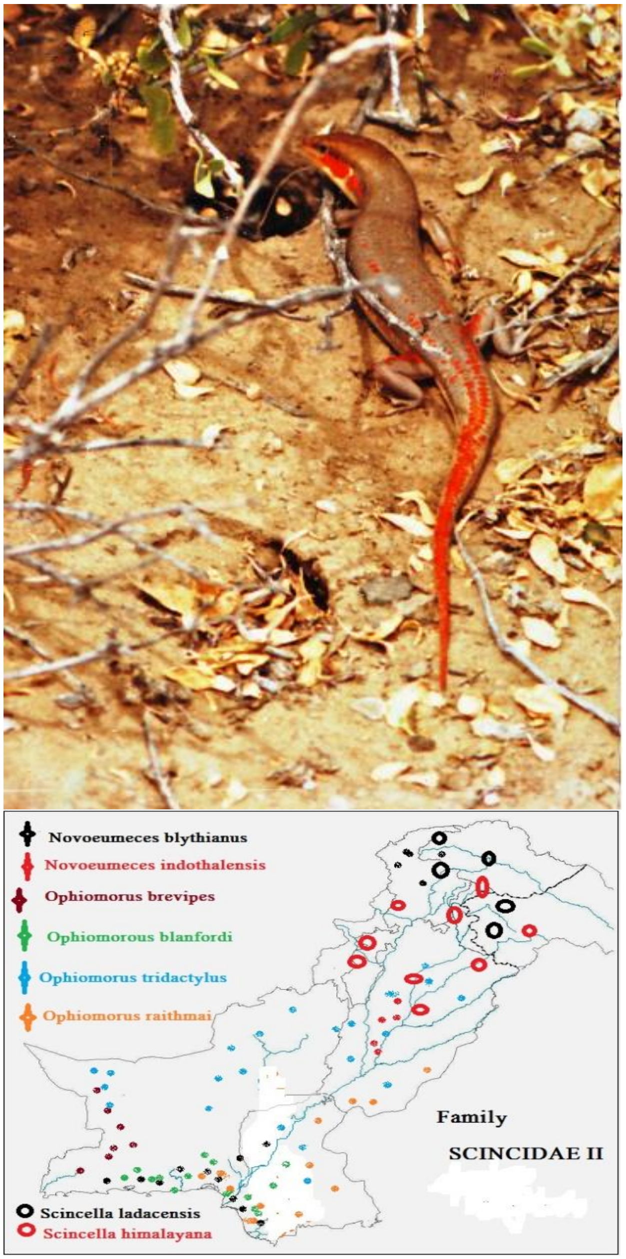


**Fig.8.9.** *Novoeumeces blythianus* (J. Anderson). B shows distribution of various species of the family Scinidae in different part of Pakistan.

2. Nasal scale is resting on first supralabial; nasal suture horizontal; no postnasal.
3. Interparietal about half the size of frontal and is of the same shape.
4. Azygous postmentals 2.
5. Middorsal row of 52-56 wide paired scales.
6. Posterior loreal and presuboculars are longer than deep.
7. No intercalary scales between subdigital lamellae.

   Snout-vent length 54-57 mm, tail 40+ mm

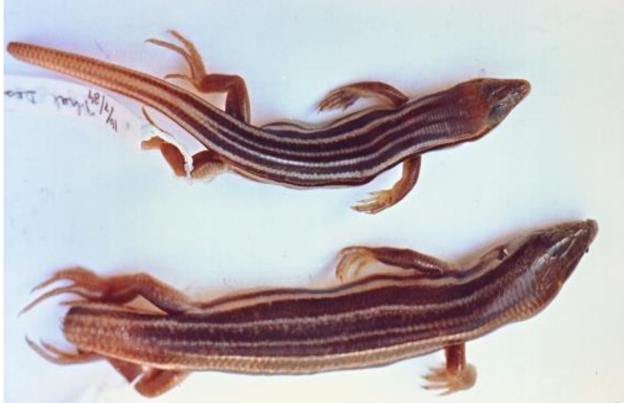


**Fig.8.10.** *Novoeumeces indothalensis* **(**M.S. Khan and M.R.Z. Khan).

*Colour***:**

In formalin, 7 vivid dark brown longitudinal stripes on the body: median dorsal starts from behind interparietal and extends to the level of vent; second dorsal, paired, from behind parietals to the level of vent, join each other at the level of vent, do not extend onto the tail; third paired, from behind eye extends laterally to groin rather than along lateroventral side of tail; fourth paired from behind ear above shoulder to groin. The stripes are separated from each other by narrower lighter stripes, making the pattern distinct. Head is uniformly brownish, lips, chin, and ventrum light yellowish.

*Habitat***:**

Collected from the roots of a common reed bush, *Sachharum moonja*, close to the tilled fields, from sandy soil. The reeds were uprooted to expose the lizards.

*Range***:**

From the southwestern Thal Desert, close to the left bank of the River Indus, southwestern Punjab, Pakistan.

### *11. Novoeumeces zarudnyi* (Nikolsky)
(**Fig.8.11**)

1. Postmentals paired, azygous.
2. Nuchals 3-5 pairs.
3. Number of scales around the midbody 26-30. Snout-vent length 110-115 mm, tail 220-240 mm.

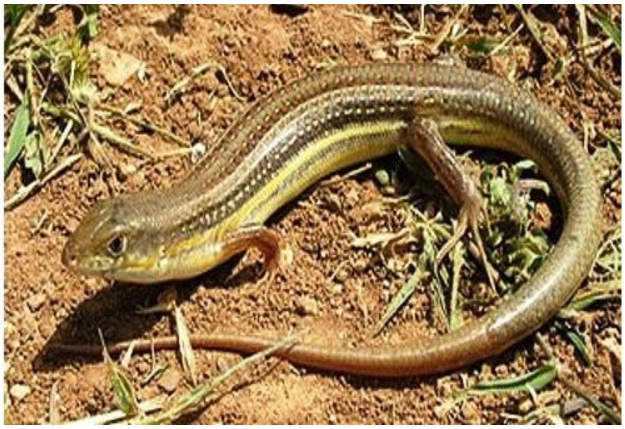


**Fig.8.11.** *Novoeumeces zarudnyi* (Nikolsky).

*Colour*:
Body blue to steel gray, ventrum white. A broad bright orange red to vermilion stripe from temple to the groin. Tail orange-red.

*Habitat*:
This skink has been collected from Island Astola, 10 km off the coast of Karachi, from a rocky terrain, with scrubby vegetation and in humid environments (Mertens,1969). It has also been recorded from the Kharan Desert, around oases, where it burrows in the roots of thorny bushes.
The lizard is diurnal, feeds on different kinds of desert arthropods. The prey is crushed in powerful jaws. Breeding is quite extended from late February to September, 6-7 eggs with pliable shells are laid in burrows, young are quite common by May.

*Range*:
Reported from central to southeastern Iran. In Pakistan, so far it is recorded from Astola Island, 10 km off the coast of Karachi (Mertens 1969a).

### *12. Ophiomorus blanfordi* Boulenger
(**Fig. 8.9B**)

1. Interparietals as long as broad.
2. Frontonasal not twice as long as broad.
3. Scales around midbody 20.
4. Fingers 4, toes 3. Snout-vent length 70-84 mm, tail 75-80 mm.

*Colour*:
In life, dorsum golden yellow to brownish, tail paler tending to gray, ventrum pearly white. Tail sky-blue in young. In preserved specimens, dorsum cream or pale brown, median 2 rows of dorsals with scattered dark spots, arranged in distinct longitudinal lines. Third and fourth rows from the vertebral line, on flanks, are with dark brown dots arranged in lines extending on to sides of the head. Head with or without a central dark streak.

*Habitat*:
This sand lizard has been collected from coastal sand dunes, with sparse vegetation. It is nocturnal, glides sinuously under the sand, its movements visible from the surface by characteristically disturbed sand. It occasionally comes out to prey upon a passing arthropod. During the day it rests buried in shade at the root of vegetation.
It breeds from March to July; 4-8 young are recorded.

*Range*:
It is known from coastal Makran, and extends into the adjoining coastal Iran.

### *13. Ophiomorus brevipes* (Blanford)
(**Figs.8.12 & 8.9B**)

1. Interparietal considerably broader than long.
2. Frontonasal about twice as broad as long.
3. Scales around midbody 22.
4. Fingers 4, toes 3.
   Snout-vent length 96-98 mm, tail 86-90 mm.

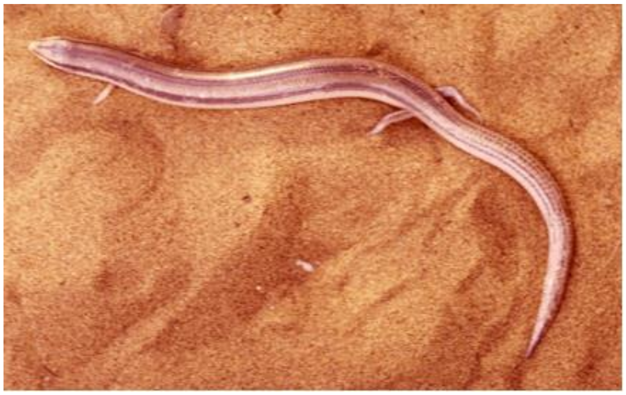


**Fig.8.12.** *Ophiomorus brevipes* (Blanford).

*Colour:*
Dorsum golden yellow, dorsal stripes occupy 10 rows of dorsal scales, arranged in 3 very distinct stripes, 1 vertebral and 2 dorsolateral.

*Habitat*:
This sand lizard is found in similar habitat and as in the preceding species.

*Range*:
Recorded from along the Iran and Pakistan border.

### *14. Ophiomorus raithmai* S. Anderson and Leviton
(**Figs.8.13 & 8.9B**)

1. Parietal not in contact with the anterior temporal.
2. Supranasal usually narrowly in contact and partially separated from each other by the tip of rostral scale.
3. Prefrontal in contact with upper labials.
4. Scales around midbody 22.
5. Both fingers and toes 3.
   Snout-vent length 82-90 mm, tail 74-79 mm.

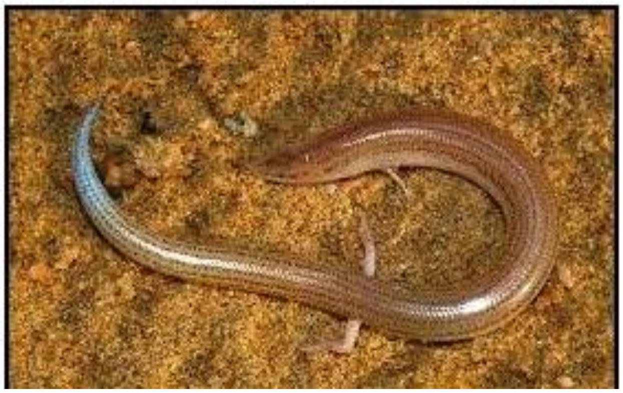


**Fig.8.13.** *Ophiomorus raithmai* S. Anderson and Leviton.

*Colour*:
In life, dorsum pale brown, often suffused with yellow ocher. Upper center of each scale is intensely ocher with dark brown spots. In formalin, cream or pale brown, scales of 8-10 median rows with dark brown line formed by discrete dots, extending from nape to the level of hind limbs, onto tail. Hind limbs with dark brown dots. A dark brown line from nostril through eye, across temporals. Dark brown markings on median head scales. Ventrum cream. Young has blue tail

*Habitat*:
The sand-fish is found in typical sand-dune habitat with sparse vegetation of grasses. It glides under the sand surface leaving a distinct sinuous track on the surface, occasionally emerging for a short time. It burrows to a depth of half meter, where the upper dry sand layer meets the deeper moist layer. Tracks of skinks radiate out from in the roots of the bushes

where the lizards have been resting for the day. Though the lizard is diurnal, its nocturnal activity has also been recorded (Minton 1966).

The stomach contents, apart from copious amounts of sand grains, contain remains of termites and other soft-bodied arthropods (Minton 1966).

Breeding season extends from March to May, and young are met with during June and August.

*Range*:

Reported so far from Kathiwar, in India, various localities in Sindh and Las Bela in Pakistan.

### 15. ***Ophiomorus tridactylus*** (Blyth)

**(Figs.8.14 & 8.9B)**

1. Supranasals usually narrowly in contact, partially separated from one another by the posterior tip of the rostral scale.
2. Prefrontals in contact with upper labials.
3. Parietal in contact with anterior temporal.
4. Postocular about as large as posterior subocular.
5. Scales around midbody 22.
6. A distinct ventrolateral ridge from snout to groin.
7. Fingers and toes 3.
   Snout-vent length 89-92 mm, tail 25-27 mm.

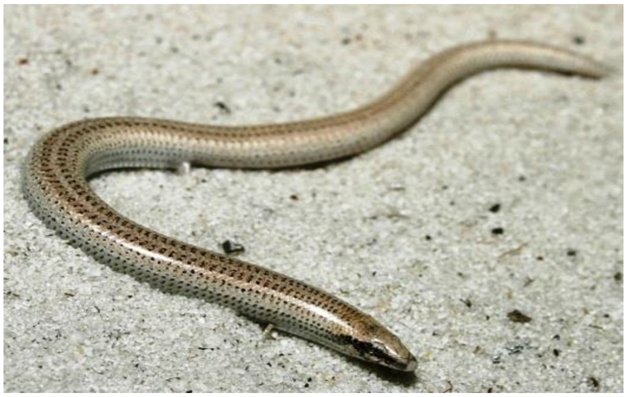


**Fig.8.14.** *Ophiomorus tridactylus* (Blyth)

*Colour*:

Dorsum yellow to khaki, tail tends to be grayish, ventrum white. Tail in juvenile sky blue.

*Habitat*:

The skink inhabits fine loose sand fields, usually along the moist soil of water courses where it is confined to the sandy banks, to the limit of the vegetation.

*Range*:

Reported from along the borders between Afghanistan, Iran, and Pakistan. In Pakistan it is known from western Balochistan**,** Dera Ghazi Khan, Thal and Cholistan Deserts, Punjab, Pakistan.

### 16. ***Scincella himalayana*** (Günther)

**(Figs.8.15 & 8.9B)**

1. Scales around midbody 26-30.
2. Prefrontals usually separated from each other.

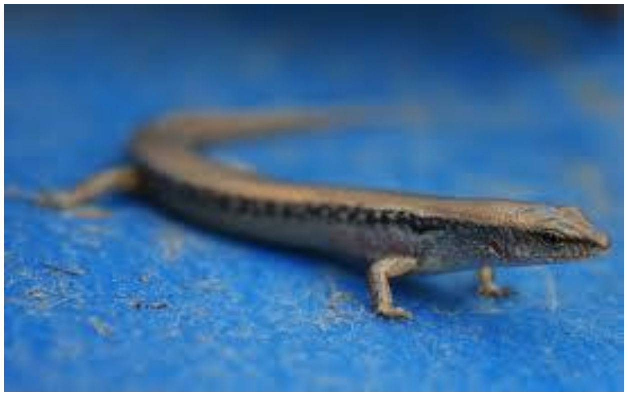


**Fig.8.15.** *Scincella himalayana* (Günther).

3. Lamellae under fourth toe 14-20.
   Snout-vent length 67-70 mm, tail 64-70 mm.

*Colour*:

Dorsum iridescent bronze, with indistinct light or dark specks, a dark vertebral stripe present in some individuals. A narrow yellow lateral stripe with irregular edge, another narrow dark brown stripe extends from snout through eye, bordered below by a narrow irregular whitish stripe edged with black. All stripes continuing to the middle of the tail, distal part of it is bronze with light and dark flecks. Head and limbs bronze, with dark speckling, ventrum bluish white.

*Habitat*:

This lizard is found under stones and other objects in moist grass fields along margins of lakes and other water bodies in the Kaghan Valley, at about 3000 m of elevation. It has also been collected along the sides of water courses in alpine Punjab and Azad Kashmir. In Salt Range, it is confined to grass fields in stony terrain, around Sakesar, in Soan Valley, Punjab, Pakistan.

The lizard slips from one stone to another and only a keen eye can follow its movement. In thorny bushy areas, as in Soan Valley, it takes to the roots of bushes from where it is difficult to retrieve. Its burrows are situated under stones; at places it descends into large holes and crevices in the ground. Food mainly consists of arthropods, predominantly butterflies and beetles, and worms have also been recorded from its stomach.

It breeds from April to July; 2-3 oval eggs with pliable shells are laid in moist environs under a stone, and juveniles are seen moving about from May to late August.

*Range***:**

A mountain lizard, it is recorded from Nepal to Turkmenistan. In Pakistan it abounds in marginal vegetation along water courses in alpine Punjab, Salt Range, Chitral, Waziristan, and Kalabag, District Mianwali.

### ***17. Scincella ladacensis*** (Günther)

(**Figs.8.16 & 8.9B**)

1. Scales at midbody 32-38.
2. Prefrontals in contact with each other, or just separated.
3. Lamellae under fourth toe 20-24.
   Snout-vent length 53-56 mm, tail 55-58 mm.

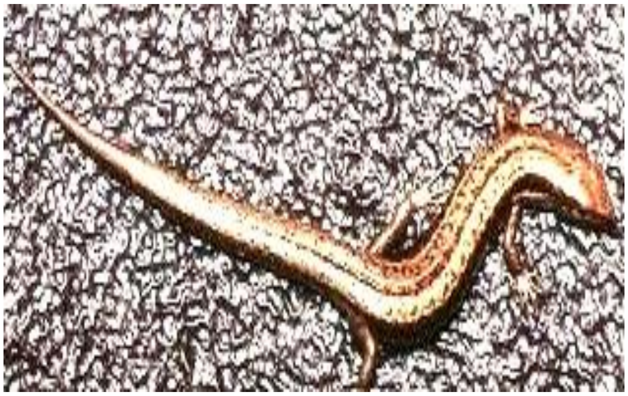


**Fig.8.16.** *Scincella ladacensis* (Günther).

*Colour*:

Bronze or olive dorsum, profusely speckled with black, each speck with a white or golden central mark. A dark brown stripe along sides of the neck and body, spotted with light brown, bordered above with white. Sides with small dark dots. Ventrum bluish or gray, ventral scales bordered with gray.

*Habitat*:

This lizard is alpine in habits, occupies almost the same habitat, and has the same habits as the preceding species.

*Range*: Reported from Kahajeng Khola, in Nepal, the highest altitude (6000 m) so for reported for any cold-blooded vertebrate. In Pakistan it has been reported from Baltistan.

# APPENDIX

## Scientific, common English and Urdu names

| Scientific names | Common English | Roman English | Urdu |
|---|---|---|---|
| **Family Scincidae** | **Skinks** | ***Raig mahi*** | ریگ ماہی |
| ***Ablepharus grayanus*** (Stoliczka, 1872) | Earless Snake-eyed Skink: | *Boly saamp-chism raig mahi* | بولی ریگ ماہی |
| ***Ablepharus pannonicus*** (Fitzinger, 1823) | Red tail Snake-eyed Skink: | *Surakh-dum saamp-chism raig mahi* | سرخ دُم ریگ ماہی |
| ***Chalcides ocellatus*** (Forskål, 1775) | Ocellate Skink | *Tikka dar raig mahi* | ٹکے دار ریگ ماہی |
| ***Eurylepis taeniolatus taeniolatus*** (Blyth, 1854) | Yellow-belly Mole Skink: | *Maidani raig-mahi* | زرد شکم ریگ ماہی |
| ***Lygosoma punctata*** (Linnaeus, 1766) | Spotted Garden Skink | *Baghban raig mahi* | باگبان ریگ ماہی |
| ***Eutrophis dissimilis*** (Hallowell, 1860) | Striped Grass Skink: | *Patti-dar Ghas-goodi* | پٹیدار گھاس گُڈی |
| ***Eutrophis macularia*** **(**Blyth, 1853) | Bronze Grass Skink | *Bhoori Ghas-goodi* | بھوری گھاس گُڈی |
| ***Novoeumeces blythianus*** **(**J. Anderson, 1871) | Orange-tail Skink: | *Zard ghas goodi* | زرد گھاس گُڈی |
| ***Novoeumeces indothalensis*** (M.S. Khan & M.R.Z. Khan, 1997) | Thal Skink | *Thal raig mahi* | تھل ریگ ماہی |
| ***Novoeumeces schneiderii zarudnyi*** (Nikolski, 1900) | Red-stripe Skink | *Surkh dahari raig mahi* | سرخ دھاری ریگ ماہی |
| ***Ophiomorus blanfordi*** Boulenger, 1887 | Makran Sand Swimmer: | *Makrani raig mahi* | مکرانی ریگ ماہی |
| ***Ophiomorus brevipes*** **(**Blanford, 1874) | Four-finger Sand Swimmer: | *4-ungushti raig mahi* | چار اُنگشت ریگ ماہی |
| ***Ophiomorus raithmai*** S. Anderson & Leviton, 1966 | Three-finger Sand Swimmer: | *3-ungushti raig mahi* | تین اُنگشت ریگ ماہی |
| ***Ophiomorus tridactylus*** (Blyth, 1853) | Three-toe Sand Swimmer: | *3-toed raig mahi* | تین اُگشتِ پا ریگ ماہی |
| ***Scincella himalayana*** (Günther, 1864) | Himalayan Skink | *Himalayai bahmani* | ہمالیائی باہمنی |
| ***Scincella ladacensis*** (Günther, 1864) | Ladakh Skink | Ladakhi bahmani | لدّاخی باہمنی |

# Chapter 9

## Uromastidae & Varanidae

Family Uromastidae......................................135
Family Varanidae..........................................137

*Saara hardwickii*

### Family Uromastidae

Key:

1. Body dorsum with uniform granular scales, caudal spines smaller, 20-24 in a row at the base of the tail..............................................................*Saara hardwickii*

   Body dorsum with granular scales interspersed with transverse rows of spiny scales; caudal spines larger, 8-10 in a row at the base of the tail............ *Saara asmussi*

### ***Saara asmussi*** (Strauch)

**(Fig.9.1)**

1. Head with heterogeneous obtusely keeled scales, nape with numerous spinose tubercles.
2. Dorsal scales granular, keeled, interspersed with numerous transverse rows of large pointed tubercles.
3. Tail thick at base, strongly depressed, covered with large spinose tubercles, 8-10 in a row, rounded at their bases, spines separated by 3-4 rows of keeled scales.

   Snout-vent length 255-269 mm, tail 215-220 mm.

*Colour*:

Dorsum pale greenish brown; head, limbs and tail darker; belly dirty yellowish brown, heavily mottled, in female dirty brownish.

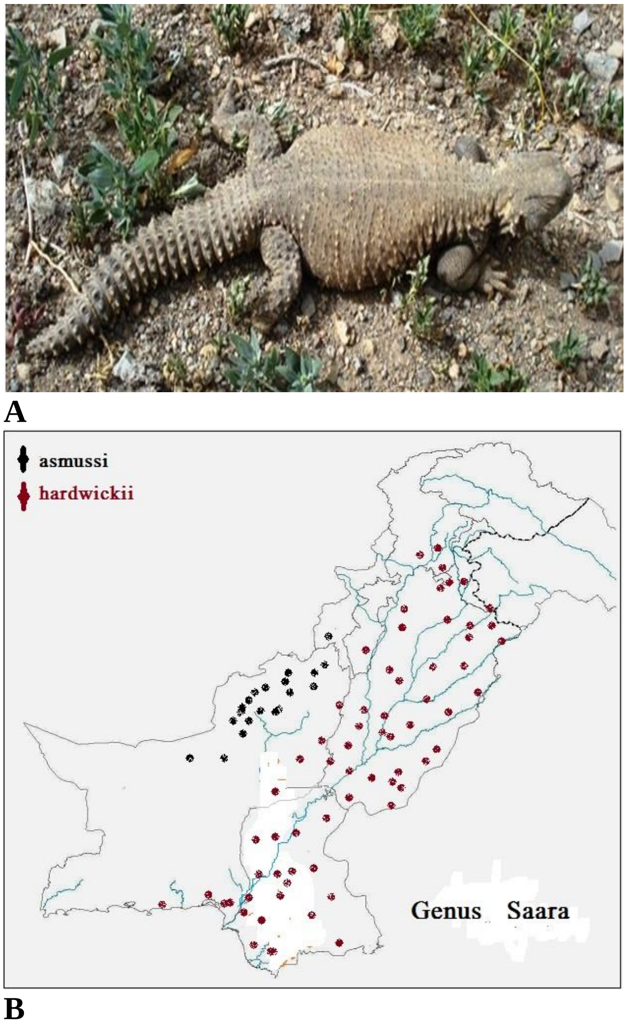


**Fig.9.1.** *Saara asmussi* (Strauch). B shows distribution of *Saara* spp in different parts of Pakistan

*Habitat*:

Frequents deserticolous habitat, at the fringe of sand deserts along the Iran-Afghanistan border. The habitat is a gravel plain soil, with scattered patches of low thin bushes of barilla and tamarisk. The lizard is rather sluggish; however, it is a good runner. Its burrow has a wide opening. It feeds on leaves and flowers of grasses and other vegetation around.

*Range*:

The lizard has been collected from the southern Iran and along the Afghan-Iran border. In Pakistan it has been reported from the Chagai area.

### ***2. Saara hardwickii*** Gray
(**Figs.9.2 & 9.1B**)

1. Head and body with uniform granular scales.
2. Caudal spines squarish at their bases, 20-24 in a row at the midtail.
   Snout-vent length 245-250 mm, tail 160-165 mm.

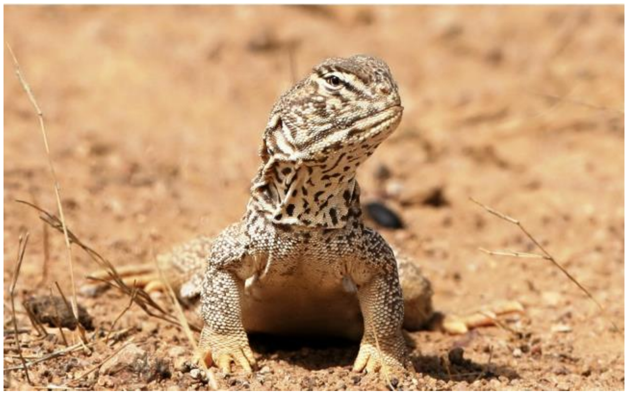


**Fig.9.2.** *Saara hardwickii* Gray

*Color*:

Body dorsum uniformly light sandy gray or yellowish brown, with dark spots or dark vermiculations. Ventrum white, throat spotted with dark. A large distinct blue-black blotch on groin.

*Habitat*:

A characteristic diurnal ground lizard of vast tracts of hard soil throughout the Indo-Gangetic plains. It avoids stony and sandy areas. It makes its burrows in desolate hard soil, areas with sparse vegetation of grasses and bushes. Colonies of lizards are located at slightly elevated areas, probably elevated by the excavated earth.

*Range*:
Widely distributed in barren desolate tracts of hard soil, with moderate to sparse xerophytic vegetation, throughout the Indo-Gangetic plains. In Pakistan it has been recorded from throughout the Indus Valley and extends into Las Bela, southern Balochistan.

## Family Varanidae

**Key:**

1. Tail compressed with a median dorsal ridge; scales on side of neck keeled........... 2
   Tail round in cross-section, ridge slightly indicated along the middle of tail; scales on the sides of neck conical.......*Varanus griseus*
2. Naris nearer to the tip of snout than eye ............................... *Varanus flavescens*
   Naris nearer to eye than the tip of snout............................*Varanus bengalensis*

### 1. *Varanus bengalensis* (Daudin)
(**Fig.9.3**)

1. Naris a little nearer to orbit than tip of the snout.
2. Scales on head longer than nuchals, which are round, not keeled.
3. Supraoculars small subequal.
4. Abdominals smooth, in 90-110 transverse rows.
5. Digits elongate.
6. Tail strongly compressed with a double toothed dorsal crest.
7. Lateral caudals keeled, a little smaller than subcaudals.
   Snout-vent length 815-900 mm, tail 1230 mm.

*Colour*:
Dorsum olive to brown, with dark spots. Ventrum yellowish, with or without dark spots, especially under the neck.

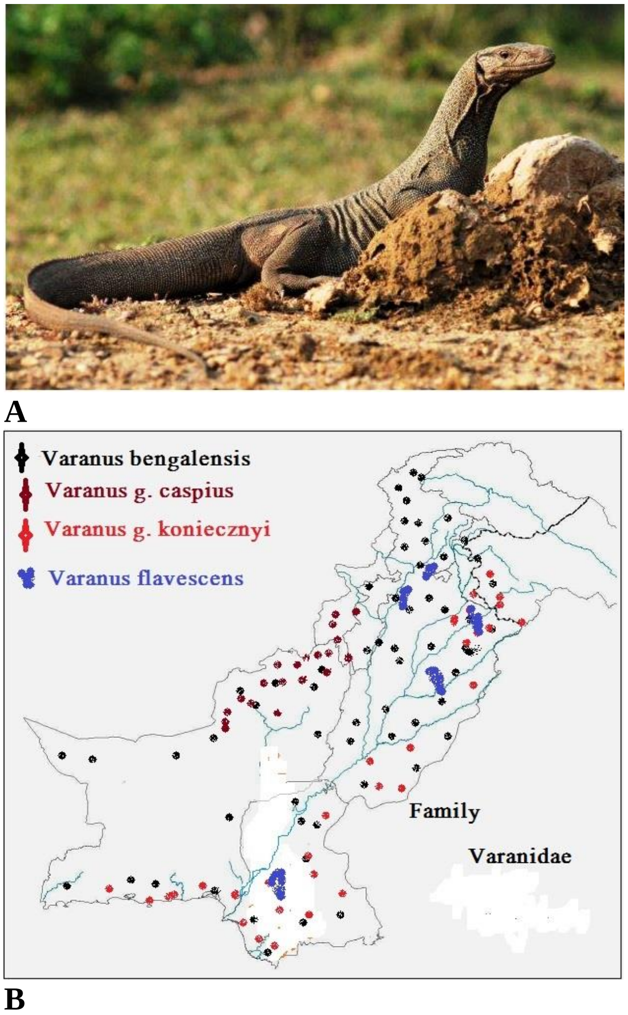


**Fig.9.3.** *Varanus bengalensis* (Daudin). B shows distribution of various species of family *Varanidae* in different parts of Pakistan.

*Habitat*:
Frequents moderately dry forests, and extends into cultivated areas, where it inhabits tracts of barren badlands. It often invades inhabited houses, attracted by poultry and rodents. Essentially a burrower, it is also a good tree climber.

*Range*:
Recorded from Assam, Myanmar, Nepal, Sikkim, throughout India, and Sri Lanka. In Pakistan, it is reported from throughout the

plains of Punjab and Sindh, sub-Himalayan tracts, Waziristan and extends westward into southeastern Iran and eastern Afghanistan.

### *2. Varanus flavescens (*Hardwicke and Gray)

(**Figs.9.4 & 9.3B**)

1 Naris a little nearer to snout tip than orbit.
2. Scales on head smaller than nuchals, which are strongly keeled.
3. Middle supraocular slightly elongated transversally.
4. Abdominals smooth, in 65-75 transverse series.
5. Digits short.
6. Tail strongly compressed, with a double-toothed crest.
7. Subcaudals not much longer than lateral caudal scales.

   Snout-vent length 500-515 mm, tail 575-600 mm.

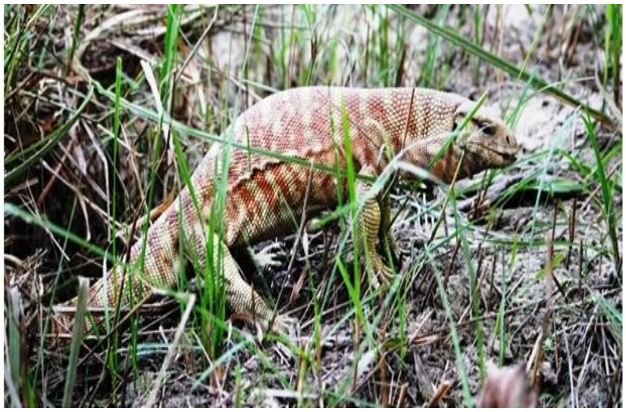


**Fig.9.4.** *Varanus flavescens (*Hardwicke and Gray).

*Colour*:
Dorsum reddish brown, body and tail barred with alternating dark-edged reddish brown and dirty yellow bars, ventrum light yellow.

*Habitat*:
It is a lizard of seasonally flooded forests, and marshy areas in flood plains of the Indus River and its tributaries. It extends into tilled fields along water courses with mesic habitat, and usually burrows in the roots of trees and other vegetation.

*Range*:
The Salt Range, District Sialkot and the Sindh Delta in Pakistan. It is known to extend to the western Bengal.

### *3. Varanus griseus* (Daudin)

(**Fig.9.5**)

1. Naris much nearer to orbit than the end of snout.
2. Head scales longer than nuchals, those on neck conical.
3. Supraoculars small, subequal.
4. Dorsals obtusely keeled.
5. Abdominals smooth in 110-125 transverse rows.
6. Digits moderately elongated.
7. Tail round or slightly compressed at its posterior half.
8. Lateral caudal scales indistinctly keeled, slightly smaller than the subcaudals.

   Snout-vent length 560-579 mm, tail 865-870 mm.

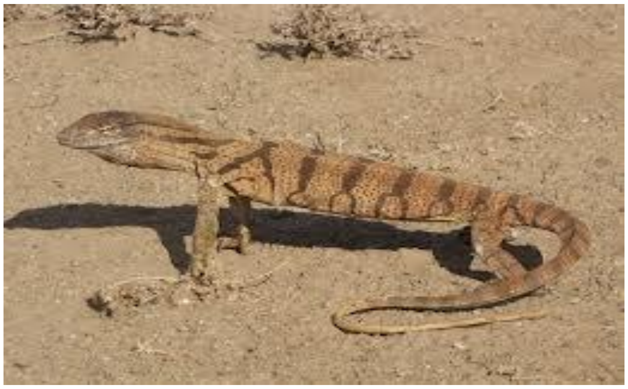


**Fig.9.5.** *Varanus griseus* (Daudin).

*Color*:
Dorsum gray to yellowish brown; body and tail with brownish crossbars; 2-3 streaks on neck; ventrum yellowish. In adult vivacity of dorsal pattern is lost.

*Habitat*:
Varanid of sandy fields with uneven surfaces and tracts of hard soil with sparse vegetation. It excavates burrows in the roots of trees and bushes.

*Range*:
Wide ranging in arid desert areas of India, Pakistan, and the Middle East, from Rajasthan to the Caspian Sea and North Africa.
The Pakistani population distinguished in two races:

### Races

#### *1. Varanus griseus caspius* (Eichwald)
(**Fig.9.3B**)

1. Only the posterior half of the tail is compressed in a dorsal crest.

*Colour*:
Body with 5-6, while tail has 16-19 transverse bands.

*Range*:
From the Transcaspian Desert to southern Khazakistan and Afghanistan, extending into northern and western Balochistan.

#### *2. Varanus griseus koniecznyi* Mertens
(**Figs.9.6 & 9.3B**)

1. Tail round throughout, without a dorsal crest.

*Colour*:
Body with 4, tail with 10-15 transverse bands.

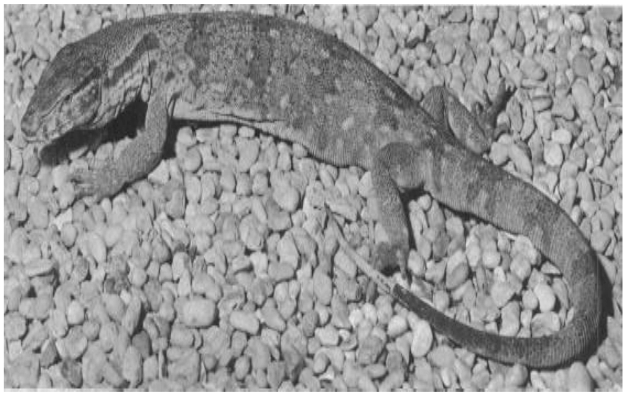


**Fig.9.6.** *Varanus griseus koniecznyi* Mertens.

*Range*:
Deserts of India and Pakistan.

# APPENDIX

## Scientific, common English and Urdu names

| Scientific names | Common English | Roman English | Urdu |
|---|---|---|---|
| **Family Uromastycidae** | **Spiny Tail Lizard** | ***Sanda, Khar-dum Kirla*** | سانہ، خاردُم کرلا |
| *Sara asmussi* (Strauch, 1863) | Seistan Spiny-tail Lizard | *Seistani sanda* | سیستان خاردُم |
| *Sara hardwickii* Gray, 1827 | Indus Spiny-tail Lizard: | *Indus valley sanda* | وادیٔ سندھ خاردُم |
| **Family Varanidae** | **Monitor Lizard** | ***Goh*** | گوہ |
| *Varanus bengalensis* (Daudin, 1802) | Bengal Monitor | *Bengali Goh* | بنگالی گوہ |
| *Varanus flavescens* (Hardwicke & Gray, 1827) | Yellow Monitor: | *Peeli Goh* | پیلی گوہ |
| *Varanus griseus* (Daudin, 1803) | Desert Monitor: | *Registani Goh* | ریگستانی گوہ |
| *Varanus g. caspius* (Eichwald, 1831) | Caspian Monitor: | *Koh-kaf Goh* | کوہ کافی گوہ |
| *Varanus g. koniecznyi* Mertens, 1954 | Cholistani Monitor | *Cholistani goh* | چولستانی گوہ |

# PART-IV

## SNAKES

*Python molurus*

# Chapter 10

## Non-Venomous Snakes: Boidae, Colubridae, Typhlopidae & Leptotyphlopidae

Family Boidae............................................. 143
Family Colubridae ....................................... 146
Family Typhlopidae...................................... 174
Family Leptotyphlopidae.............................. 178

### Family Boidae

**Key:**

1. Head with large symmetrically arranged scales; subcaudals in double row …………...........*Python molurus*
   Head with small scales; subcaudals in a single row ..................................................2
2. Mental groove present................................3
   Mental groove absent ..............*Eryx conicus*
3. Body scales smooth in anterior half; cloacal and caudal scales keeled; 49 scale rows at midbody...................*Eryx tataricus*
   All body scales keeled; 51-61 scale rows at midbody ...................................*Eryx johnii*

### Sand Boas

#### ***1. Eryx conicus*** (Schneider)

(**Fig.10.1**)

1. Head slightly distinct from neck.
2. Rostral wide, not wedge-shaped, without free edge.
3. Nostril slit between nasals and internasal.
4. Supralabials 11-13, infralabials 14-17.
5. No mental groove.
6. Body tapering abruptly posterior to vent, tail very short and blunt.
7. Scales at midbody 45-56, dorsals keeled,

keels particularly heavy in posterior part of body.

8. Ventrals 161-178, subcaudals 18-22. Snout-vent length 730-732 mm, tail 68-70 mm.

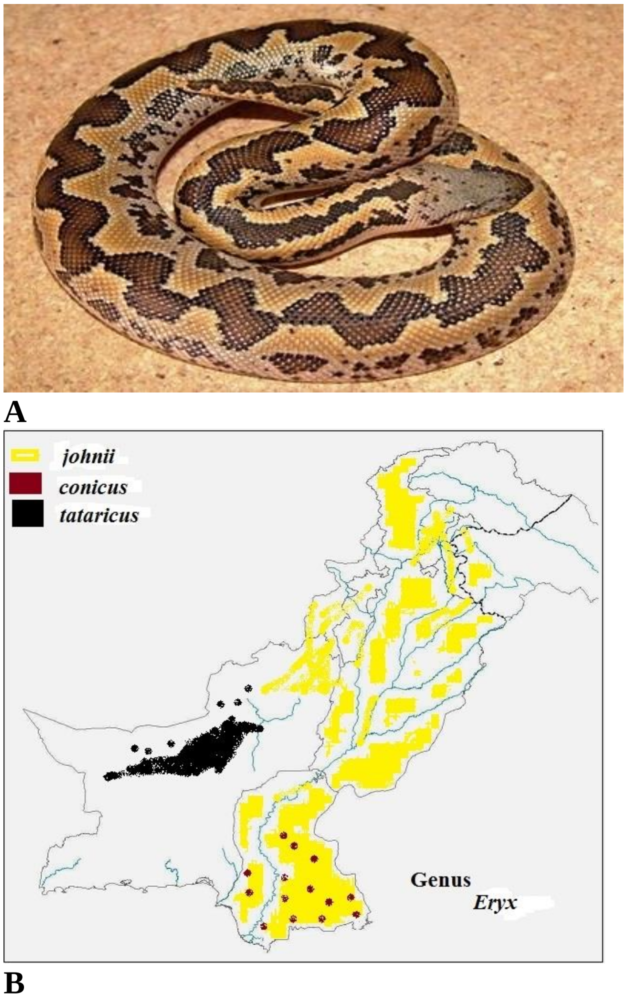


**Fig.10.1.** *Eryx conicus* (Schneider). B shows distribution of species of Genus *Eryx* in different parts of Pakistan.

*Colour*:

Light gray to yellowish or rusty. A series of vertebral irregular dark brown to sooty oval blotches, narrowly edged with dull yellow, usually confluent with each other. A similar lateral irregular series. A dark stripe behind eye. Belly white with scattered gray spots.

*Habitat*:

Frequents comparatively moist sandy and silty soil. Is timid, shy; nocturnal. When in danger bury itself in the soil. When provoked, it throws itself in a coiled ball; when touched it flinches, occasionally slashing to strike with its whole body. The snake allows moderate handling, is of uncertain temperament, bite is painful.

*Range*:

From Bihar, Orissa through India and Sri Lanka. In Pakistan it has been reported from southern Sindh and the Cholistan Desert.

### 2. ***Eryx johnii*** (Russell)
### (**Figs.10.2 & 10.1B**)

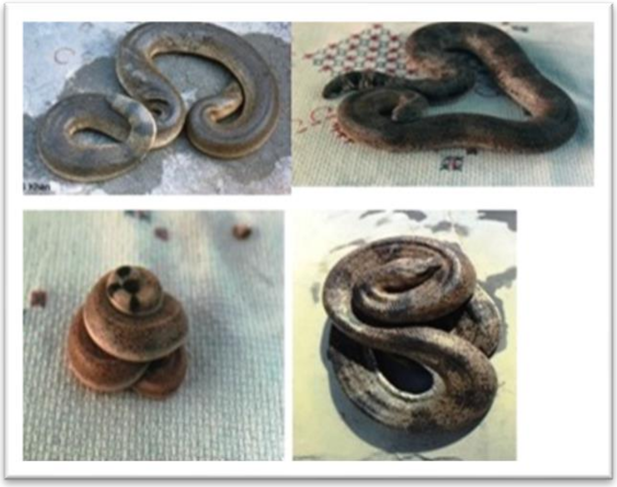


**Fig.10.2.** *Eryx johnii* (Russell).

1. Rostral wide, thick with a ridge.
2. Nostril slit between large nasals.
3. Supralabials 9-12, infralabials 13-18.
4. Scales in circumorbital ring 9-12
5. Scales at midbody 51-61; smooth or weakly keeled in anterior half, while heavily keeled in posterior half of the body.
6. Tail blunt, terminating in small scales
7. Ventrals 190-212, subcaudals 20-40. Snout-vent length 940-945 mm, tail 89-92 mm.

*Colour*:
Juveniles characteristically light reddish in color, with 11-17 dark crossbars on body. Tail lighter with 2-5 crossbars. Ventrum cream, lightly speckled with pale and dark gray.
Body becomes darker with age, with slight traces of bands on a uniformly brown or dark brown dorsum; however, the caudal bars are retained.

*Habitat*: Characteristic of moderate deserts of loose soil with sparse vegetation; it becomes rare in sandy stony and damp soil. It readily invades human habitations, attracted by mice and rats, where it resides in their burrows, a powerful constrictor

*Range*: Occurs throughout central India. In Pakistan recorded from the plains of Punjab, Sindh, and Balochistan. It is reported from eastern Afghanistan and Iran.

### 3. *Eryx tataricus speciosus* Zarevsky
**(Figs.10.3 & 10.1B)**

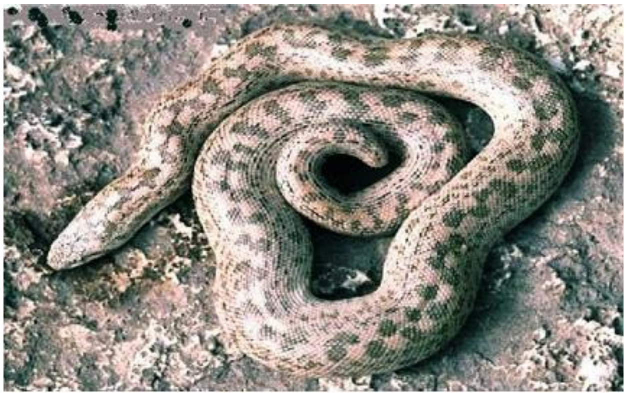


**Fig.10.3.** *Eryx tataricus speciosus* Zarevsky.

1. Rostral much wider than high.
2. Supralabials 11-12, infralabials 16.
3. Circumorbital scales 10-11.
4. Tail blunt, terminating posteriorly in a large shield.
5. Dorsals 49 at midbody, smooth anteriorly, slightly keeled posteriorly.
   Snout-vent length 335-338 mm, tail 45-47 mm.

*Colour*:
Dorsum yellowish brown, lighter on sides. A median series of 45-50 brown irregular blotches. Body flanked with dark flecks and spots. Ventrum lighter.

*Habitat*:
Frequents sandy terrain with sparse vegetation of clumps of grasses and scattered bushes. A timid species which allows considerable handling. However, when alarmed, it throws itself into a ball.

*Range*:
From the Aral Sea to the Altai Mountains and Iran. In Pakistan it is reported from northwestern Balochistan.

### 4. *Python molurus* (Linnaeus)
**(Fig.10.4)**

1. Large, heavy bodied snakes; head distinct from neck, with large shields; eye with vertical pupil.
2. Dorsals smooth, 60-75 rows at midbody.
3. Ventrals not extending to the full width of ventrum, 245-278, subcaudals 58-75.
   Total maximum length reached about 6 m.

*Colour*:
Dorsum light yellowish to cream, grayish or brownish above. A median series of large elongated subquadrangular dark gray, brown, or reddish brown dark edged blotches becoming more irregular in posterior half of the body. A postocular and another subocular streak. Ventrum marbled with yellow and dark spots.

*Habitat*:
Inhabits undisturbed thick forests, rocky edges, near marshy areas, close to lakes and streams. It lives close to the water in large dens, in dense clumps of vegetation. In forests it generally occupies hollows of tree trunks. Swims fairly

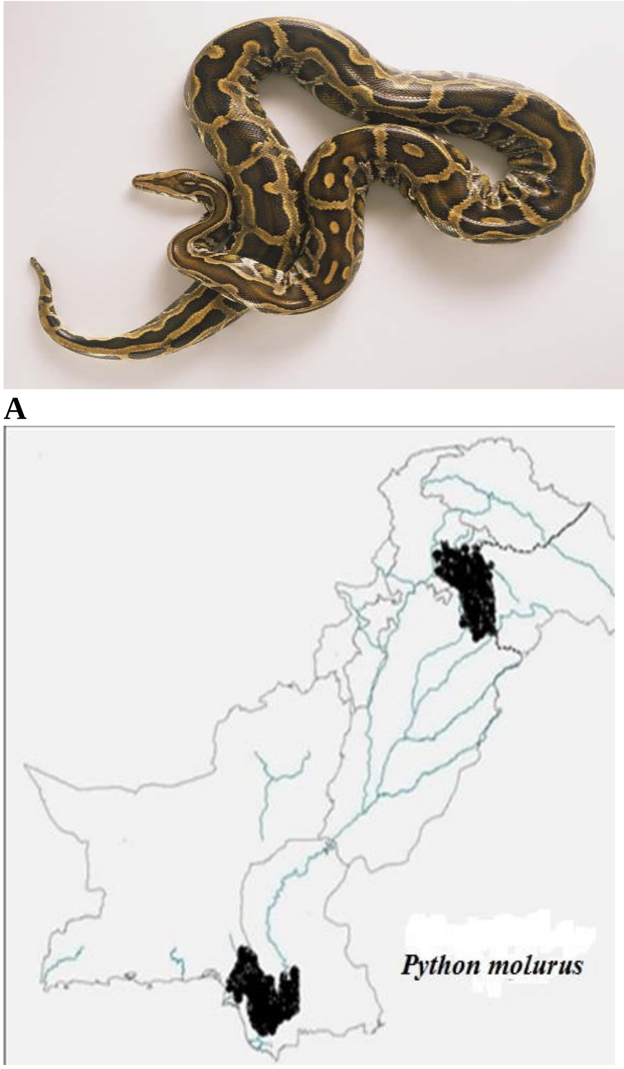


**Fig.10.4.** *Python molurus* (Linnaeus). B shows the distribution of *Python molurus* in different parts of Pakistan.

well. It often takes refuge in large caves and unattended ruins of old buildings with clumps of vegetation around, and is reluctant to move away from its established territory.

*Range*:
India, Sri Lanka, Pakistan records are from Azad Kashmir in the north and Indus Delta in the south, washed down by the flood water from north.

## Family Colubridae

### Morphology:
### Colubrid Head Scales Nomenclature

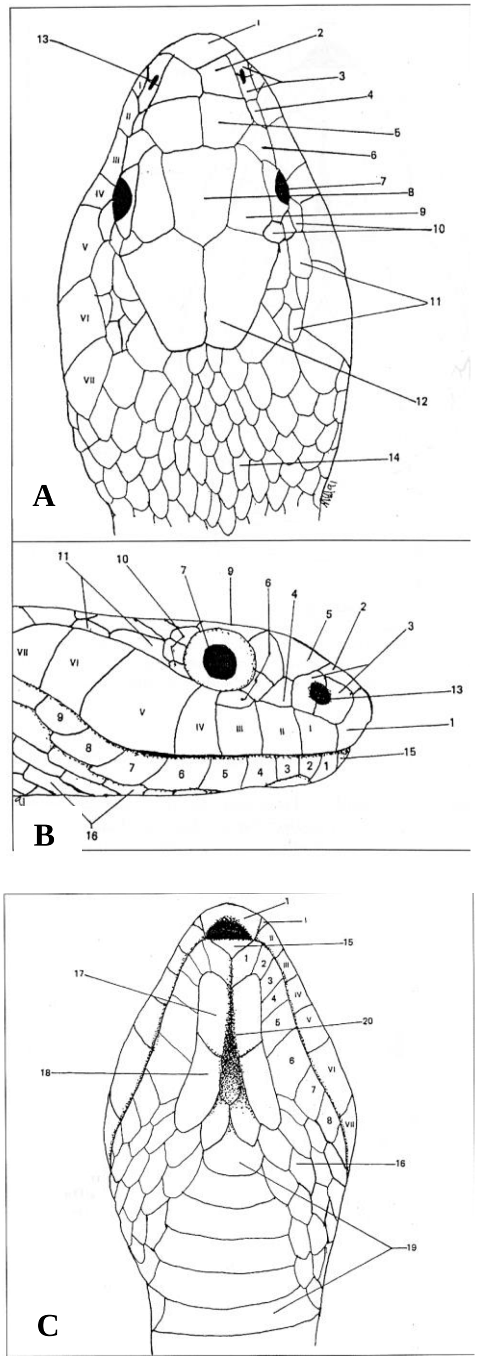


**Fig.10.5.** Colubrid head scales

**Legend of Fig 10.5.**

A. Dorsa1 side: 1 rostral, 2.internasal, 3. Nasal, 5.prefrontal, 6.preocular, 7. eye, 8. Frontal, 9.supraorbital, 10. postorbitals, 11 temporals, 12 parietal, 13 naris, 14 nuchals.

B. Lateral side: 4 loreal, 5 prefrontals, 6 preoculars, 8 frontal, 9 supraorbital, 10 postoculars, 11 temporals, 12 parietal, I-VII supralabials, 1-9 infralabials

C. Ventral side: 15 mental, 16 gulars, 17 anterior genials, 18. Posterior genial, 19 ventrals, 20 mental groove.

---

**Key:**

1. Ventrals extend across abdomen; rostral deeply grooved.......................................... 2
   Ventrals do not extend across abdomen; rostral not grooved, projected downward ........................... *Enhydris pakistanica*
2. Subocular scale present; prefrontal fragmented ................................................ 3
   Subocular scale absent; prefrontal not fragmented ................................................ 5
3. Rostral long, wedged between**,** but not completely separating internasals; midbody scales 25................*Spalerosophis arenarius*
   Rostral of normal size; midbody scale rows more than 25 ............................................. 4
4. Belly white with gray smudges; subcaudals less than 100....... *Spalerosophis* .........................................*schirazianus*
   Belly with reddish tint; subcaudals more than 100 ..................*Spalerosophis diadema*
5. Dorsals smooth throughout........................ 6
   At least some rows of dorsals keeled....... 29
6. Lower jaw countersunk.............*Argyrogena* ............................................. *fasciolata*
   Lower jaw normal..................................... 7
7. Pupil of eye dark, hardly visible in life...... 8
   Pupil of eye large, clearly visible in life .. 10
8. Loreal not or slightly in contact with internasals; subcaudals in a single row ..........................*Lycodon travancoricus*
   Loreal extensively in contact with internasals; subcaudals in pairs .................9
9. Posterior nasal distinctly smaller than anterior; 8 supralabials ......*Lycodon striatus*
   Posterior and anterior nasal scales equal in size; 9 supralabials .......... *Lycodon. aulicus*
10. Rostral large, projecting, concave below; naris narrow slits .....................................11
    Rostral and naris not as above.................13
11. Rostral truncate anteriorly......*Lytorhynchus* .............................................*ridgewayi*
    Rostral pointed ........................................12
12. Fifth labial touching eye .......................*Lytorhynchus paradoxus*
    No labial touching eye ...........*Lytorhynchus* ............................................. *maynardi*
13. Pupil elliptical; head much wider than neck 14
    Pupil round, head slightly wider than neck .........................................................16
14. Head black, labials and chin scales dark; ventrals white, without dark speckling ............................*Boiga melanocephala*
    Head and rest of the characters not as above .......................................................15
15. Supralabials 8; nostrils large in a pair of nasal scales ......................... *Boiga trigonata*
    Supralabials 9-10; nostril in a partially divided nasal scale... *Telescopus rhinopoma*
16. Head and nape with a pair of oblique or dark crossbars; fewer than 60 subcaudals ................................................17
    Head and nape not as above; more than 60 subcaudals ................................................19
17. Scales rows at midbody 15; a thick dark crossbar at nape..........*Oligodon taeniolatus*
    Scale rows at midbody 17 ........................18
18. Head with a thick inverted V-shaped dark stripe, another on nape ... *Oligodon arnensis*
    Head and nape dark brown or black, a large yellow mark on each side of head ...........................*Sibynophis sagittarius*

19. Ventrals fewer than 190 .......................... 20
    Ventrals 190 or more .............................. 23
20. Cloacal scale not divided; head elongated .............................. *Psammophis leithii*
    Cloacal scale divided ............................... 21
21. Nasal scale completely divided ............... 22
    Nasal scale incompletely divided ......................*Psammophis condanarus*
22. Supralabials fourth and fifth or fifth and sixth in contact with eye .......*Psammophis schokari*
    Supralabials fourth, fifth and sixth in contact with eye ......*Psammophis lineolatus*
23. Adult exceeds 1250 mm in total length; head scales with regular dark borders ..................................... *Ptyas mucosus*
    Adult does not exceed 1100 mm in total body length; no borders around head scales ....................................................... 24
24. Anterior temporals 2; eyes large ............. 25
    Anterior temporal 1; eyes small .....................*Pseudocyclophis persicus*
25. Scales at midbody in l9 rows ................... 26
    Scales at midbody in 21 rows ......................... *Hemorrhois ravergieri*
26. Dorsals smooth, without keel**s** ................ 27
    Dorsals keeled......................................... 29
27. Single labial (5th) touching eye; body dorsum with vivid pattern of sooty black crossbars, scales of bars uniformly black................................. *Coluber karelini*
    A pair of supralabials touching eye; dorsum unicolor, or with a pattern of spots or rhombs ................................................ 28
28. Ventrals 199-211, subcaudals 82-119; dorsal pattern of light brown rhombs, center of scales forming pattern lighter ..................*Platyceps ventromaculatus*
    Ventrals 205-244, subcaudals 110-144; dorsal pattern of dark spots or unicolor, scales of the pattern unicolor ..........................*Platyceps rhodorachis*
29. Three supralabials in eye ......................... 30
    Less than three supralabials in eye .......... 31
30. Ventrals 160 or fewer ....*Amphiesma stolatum*
    Ventrals more than 160 ...........................*Amphiesma platyceps*
31. A pair of supralabials touching eye..........32
    One supralabial touching eye ...................*Xenochrophis cerasogaster*
32. Anterior temporals 1 pair; ventrals 160 or less ........................................................33
    Anterior temporal single; ventrals 160 or more....................... *Xenochrophis tessellata*
33. A pair of oblique orbitolabial dark stripes; dorsum light olive, with pattern of dark spots ........................ *Xenochrophis piscator*
    Orbitolabial stripes indistinct; dorsum yellowish green, unicolor ................*Xenochrophis sanctijohannis*

### *1. Amphiesma platyceps* (Blyth)
### (**Fig.10.6**)

1. Supralabials 8, third to fifth in eye.
2. Midbody scale rows 19, 5-7 middorsal scale rows weakly keeled.
3. Ventrals in male 205-234, in female 191-216; subcaudals divided male 88-98, female 78-96, anal divided.
   Snout-vent length 880-895 mm, tail 230-235 mm.

*Color*:

Variable in coloration: olive brown dorsum, with small dark spots; rarely a dorsolateral series of white spots. Usually a pair of white dark-edged parallel lines on dorsum, or a black line from eye to gape. Labials white or yellow. Ventrum yellowish, bordered with bright red; tail and throat mottled with black.

*Habitat*:

Recorded from Changla Gali, Pakistan. The known habitat of this snake is fast-flowing stream beds where it feeds on fishes, tadpoles, and frogs.

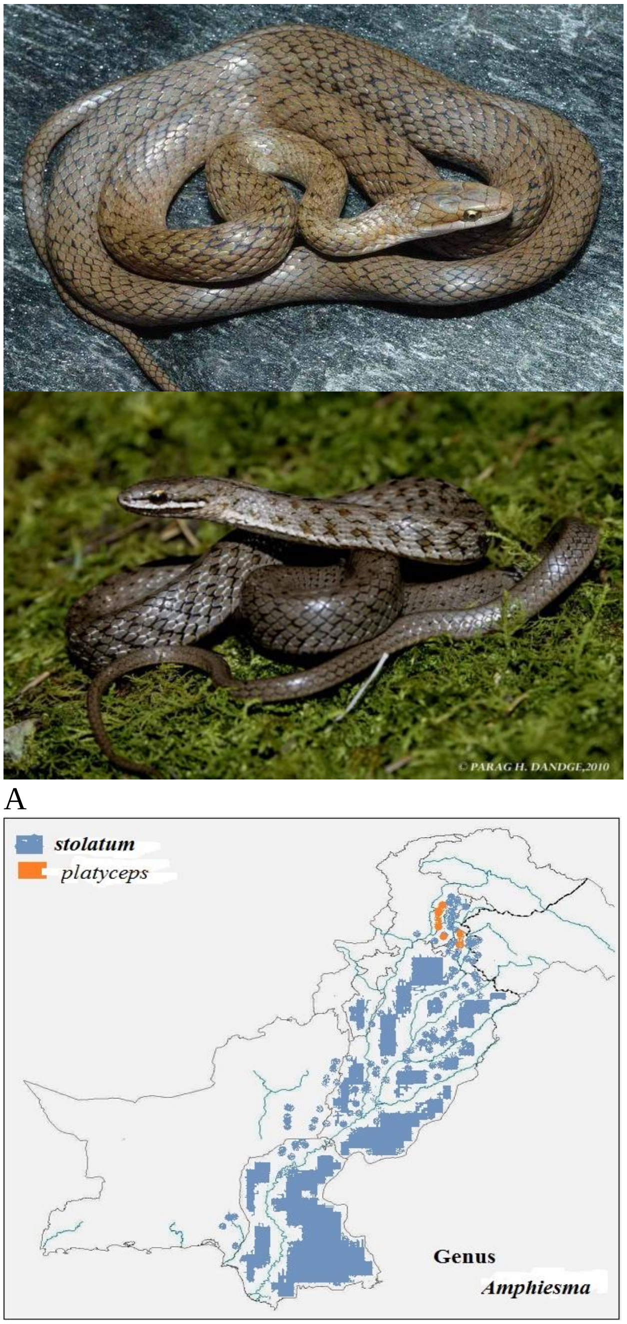


**Fig.10.6.** *Amphiesma platyceps* (Blyth). B shows distribution of species of Genus *Amphiesma* in different parts of Pakistan.

*Range*:
From western to the eastern Siwalicks, between 1500 and 3000 m of elevation. In Pakistan known only from Changla Gali, western Khyber Pakhtunkhwa, Pakistan.

### 2. *Amphiesma sieboldii* (Günther)

1. Ventrals: male 191-207, female 168-190.
2. Subcaudals: male 97-111, female 81-110.

*Range*:
Recorded from Ghora Gali in alpine Punjab, Pakistan. It has been recorded from Assam in the Eastern Himalayas.

**Taxonomic notes**
Morphologically close to *Amphiesma platyceps*. Boulenger (1890) and Smith (1943) regard these two species synonymous. Malnate (1966) treats them as sibling species.

### 2. *Amphiesma stolatum* (Linnaeus)
(**Figs.10.6B &10.7B**)

1. Head elongate, distinct from neck.
2. Supralabials 7, rarely 8; third and fourth touching eye; infralabials 10, rarely 9 or 11.
3. Posterior genial longer than anterior, not in contact with each other.
4. Scales at midbody 19, reduced to 17, at the level of vent; all scales keeled, except last row.
5. Ventrals 143-150, subcaudals 64-73, divided; anal divided.
   Snout-vent length 490-497 mm, tail 85-90 mm.

*Color:*
Body light olive brown, with a pair of dorsolateral light yellow stripes extending onto the tail. Anteriorly stripes tend to break into spots and dashes. Dark brown to black interstripe spots, more prominent anteriorly. Head bluish gray to olive. Frontal and parietals are edged with black. A V-shaped dark mark on neck. Dark bars in front, below and posterior to the eye. Ventrum white.

*Habitat*:

Characteristic snake of open grassland, frequents mesic habitat with moderate vegetation. It is diurnal and common in tilled fields, barns, under heaps of reaped crops and fallen leaves, logs, heaps of debris, etc. It is a gentle snake which seldom bites, and proves to be a good pet.

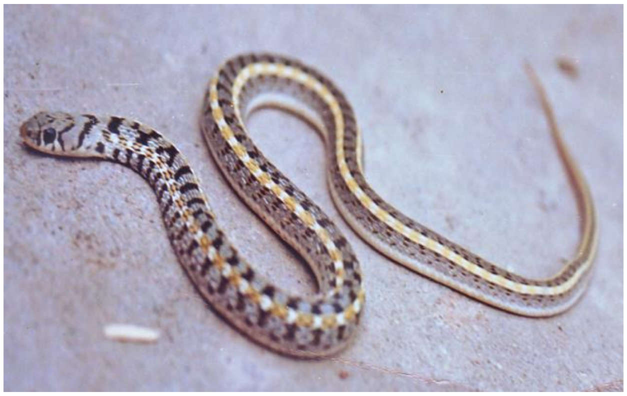


**Fig.10.7.** *Amphiesma stolatum* (Linnaeus)

*Range*:

Most wide ranging snake in the Southeast Asia. It extends from the valley of the Mekong River in Laos, Thailand, north to southern China, then throughout India, Bangladesh, Myanmar, Sri Lanka, to the Indus valley in Pakistan. It does not cross west of the Indus River into Balochistan.

### *3. Argyrogena fasciolata* (Shaw)

(**Fig.10.8**)

1. All scales smooth.
2. Nostrils between nasals and internasals.
3. Supralabials 8, fourth and fifth touching eye; 9-10 lower labials.
4. Both genials of equal size, posterior narrower.
5. Midbody scales 23, reduced to 17 just anterior to vent.
6. Ventrals 212-234; subcaudals 82-94, divided; anal divided.

   Snout-vent length 1100-1120 mm, tail 268-275 mm.

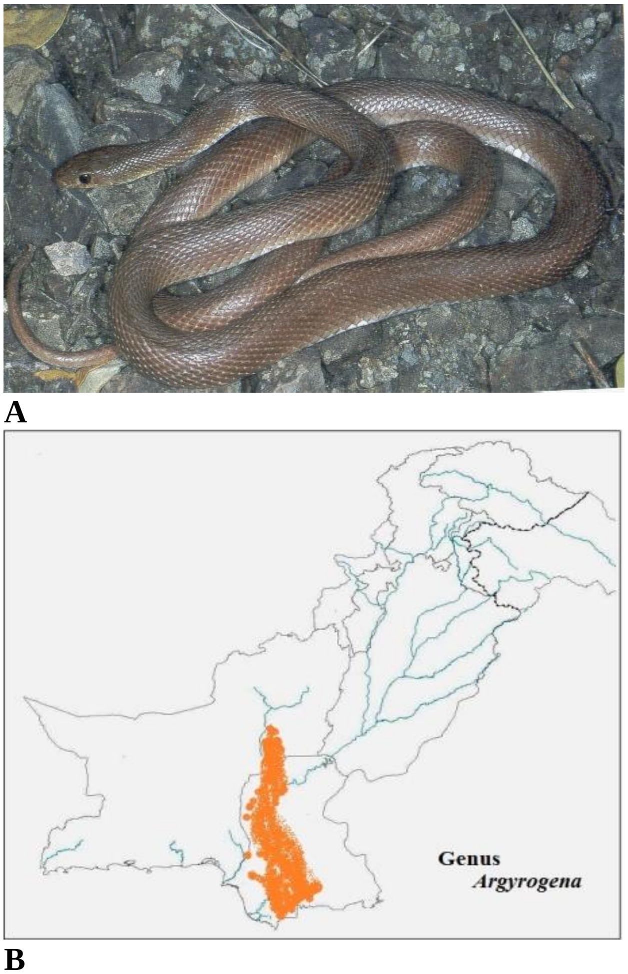


**Fig.10.8.** *Argyrogena fasciolata* (Shaw). B shows distribution of Genus *Argyrogena* in different parts of Pakistan.

*Color*:

Body reddish to grayish brown. Lower sides of scales dark. Adults unicolor, indistinct light grayish crossbars on anterior part of body in juveniles, ventrum cream.

*Habitat*:

Inhabits vast grasslands with moderately loose soil and bushes, infested with rodent burrows. A very alert, agile, and diurnal snake, moving swiftly through grass and bushes. Moderately bad tempered; when cornered it flattens its neck, hisses loudly, and attempts to bite furiously. It soon becomes a good pet, allowing moderate handling.

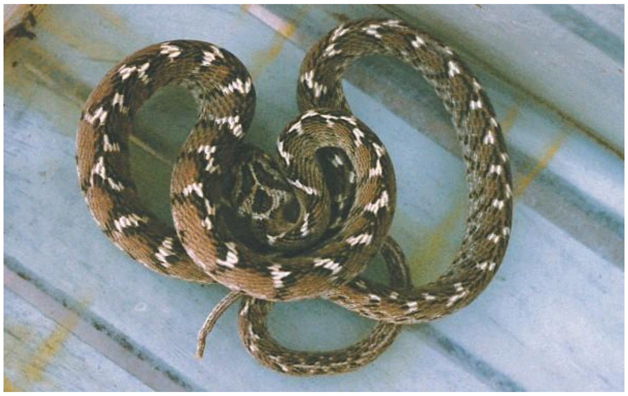
*Range*:
From Bangladesh throughout India, Sri Lanka. In Pakistan it is known from Sindh and southern Punjab.

### *4. Boiga trigonata* (Schneider)
(**Fig.10.9**)

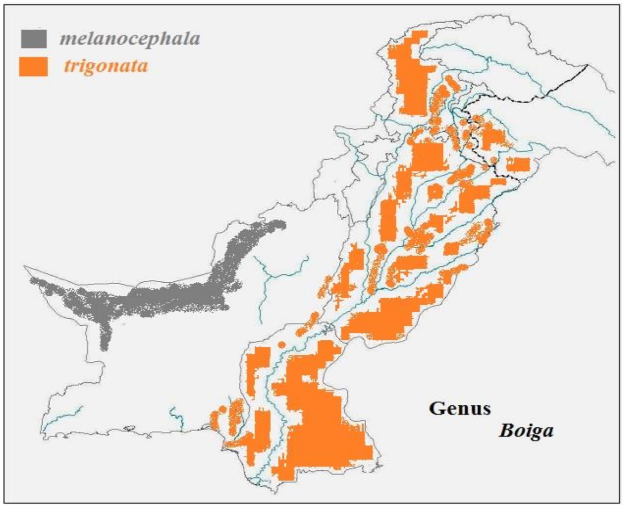
l. Head triangular, flat, very distinct from neck.
2. Eyes large, protruding, with vertically elliptical pupil.
3. Body slender, laterally compressed.
4. All scales smooth, with apical pits, 21, at midbody.
5. Supralabials 8, third and fifth in eye; infralabials 10-11.
6. Ventrals 212-239, subcaudals 76-92; anal not divided.
   Snout-vent length 990-995 mm, caudal 187-190 mm.

*Color*:
Dorsum light brown, a median series of 35-50 irregular transverse oblique white bars margined with black, more distinct anteriorly, fading on tail. Head brownish, with distinct Y-shaped light mark. A postorbital dark bar to angle of mouth. Ventrum dirty white speckled with gray.

*Habitat*:
Thick jungles, plantations, and grasslands with moderately thick bushes. It tolerates high temperatures; however, it is common in fsmesic to humid habitat. It is typically arboreal and lives among branches of trees and bushes, hiding under bark or in holes in tree trunks.



**A**



**B**

**Fig.10.9.** *Boiga trigonata* (Schneider). B shows distribution of Genus *Boiga trigonata* in different parts of Pakistan.

*Range*: From Bangladesh throughout India, Sri Lanka, Kashmir, and Pakistan, exclusive of higher mountains and Balochistan highland.

### *5. Boiga melanocephala* (Annandale)
(**Figs.10.10 & 10.9B**)

Morphologically close to *Boiga trigonata* in pholidosis and habits, however, differs from it in body coloration, choice of habitat and in its range.

1. Supralabials 8-9, third to fifth in eye; 10-11 infralabials.

2. Rows of strong diagonally arranged dorsal scales at midbody 21.
3. Ventrals 222-238, 74-94 subcaudals; anal single.
   Snout-vent length 950-955 mm, tail 172-174 mm.

*Color*:
Head top dark gray, with traces of Y-shaped light mark, labials and chin dark. Median dorsal crossbars without dark edges. Ventrum white without speckling.

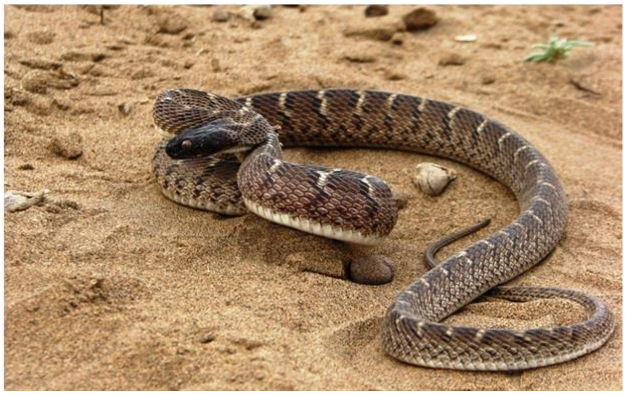


**Fig.10.10.** *Boiga melanocephala* (Annandale)

*Habitat*:
It inhabits desert fields with bushy vegetation and rocky areas with loose soil; it has occasionally been collected from low to moderately high bushes, trees in grassland, and gardens.

*Range*:
From western Balochistan through eastern Iran, Saudi Arabia, north to southern Uzbekistan.

### *6. Coluber karelini karelini*
(**Fig.10.11**)

1. Head long, distinctly wider than neck.
2. Nostrils bordered with nasals and internasals.
3. Two preoculars, upper more than twice the size of lower; 2-3 postoculars, rarely 1.
4. Supralabials 9, rarely 8, only fifth in contact with eye, a large postocular prevents sixth to coming into contact with eye; infralabials 9-10, rarely 11.
5. All scales smooth, 19 at midbody, reduced to 13 at vent.
6. Ventrals 196-209, subcaudals divided 93-97; anal divided.
   Snout-vent length 510-512 mm, tail 140-143 mm.

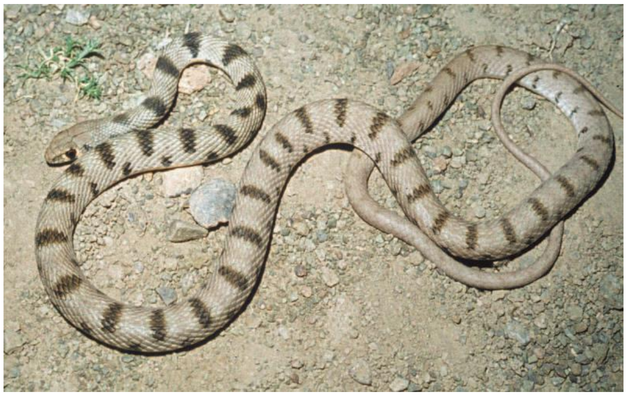
*Color*:
Dorsum pale gray to yellowish brown, with a vertebral series of 52-57 sooty crossbars, with one or two series of alternating similarly colored smaller spots on sides, outermost row touches tips of ventrals. The pattern is very vivid on body, fades on tail. Head unicolor, a subocular and temporal vivid dark band, loreal and postocular region cream, ventrum milky white.

*Habitat*:
Frequents plain deserts between elevations of 1500-3000 m in northwestern Balochistan. It lives in rodent and lizard burrows or under heaps of vegetation, logs, and stones. It is diurnal, moving about in sparse vegetation of grass and bushes.

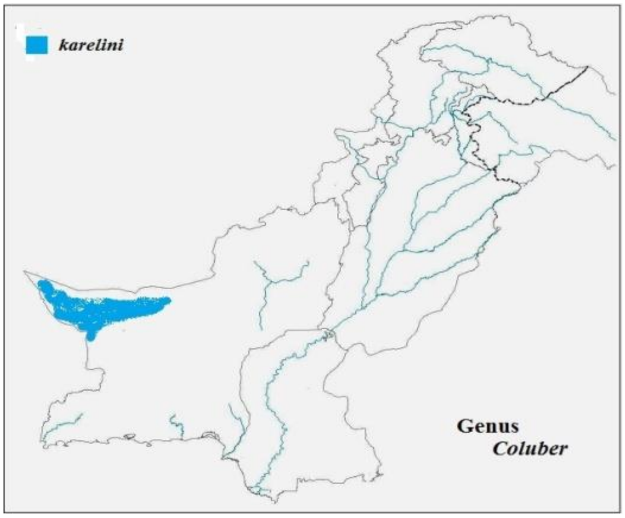
*Range*:
Recorded from Transcaspia to Kirghiz and southward to Iran and northern Balochistan, where it is recorded from Quetta and Pishin area. Specimens have also been collected from northwestern Punjab, from Sulaiman Range.

### *7. Coluber karelini mintonorum* Mertens
(**Figs.10.11B**)

1. Only fifth supralabial in eye, Ventrals 192-220. Subcaudals 114-123.
   Snout-vent length 1190 mm, tail length 360 mm.



A



B

**Fig.10.11.** *Coluber karelini mintonorum* Mertens.

*Color*:
Body with closely set diluted transverse bands, broader than interspaces. Scales in the bands with peripheral deposition of pigment.

*Habitat***:**
The snake is true racer, very agile on sand.

*Taxonomic notes:*
Mertens (1969a) described a new taxon *Coluber karelini mintonorum* from Zangi-Nawar, 27 km southwest Nushki, District Chagai, Balochistan, with only fifth supralabial in eye, ventrals 192-220, subcaudals 114-123 and body dorsum with close set diluted transverse bands, broader than interspaces, and scales in the bands with peripheral deposition of pigment. Khan (1997a) regards *Coluber karelini mintonorum* conspecific with *Platyceps rhodorachis* and remarks *"Often Coluber rhodorachis* is confused with *Coluber karelini* due to occasional specimens of *rhodorachis* with one supralabial (5th) in orbit and dorsum with alternating light and dark cross bars. Gasperetti gives photographs of similar specimens (1988,) from Afghanistan and Nushki (Balochistan). These specimens neither have dorsal vivid dark pattern nor orbitolabial and temporal stripes as in *Coluber karelini* from Quetta-Peshin, Balochistan". Merten's (1969) *Coluber karelini mintonorum* is a color variant of *Platyceps rhodorachis rhodorachis* and has also been collected from rocky areas in the Sulaiman Range, in the western Punjab, Pakistan (Khan 1997a).

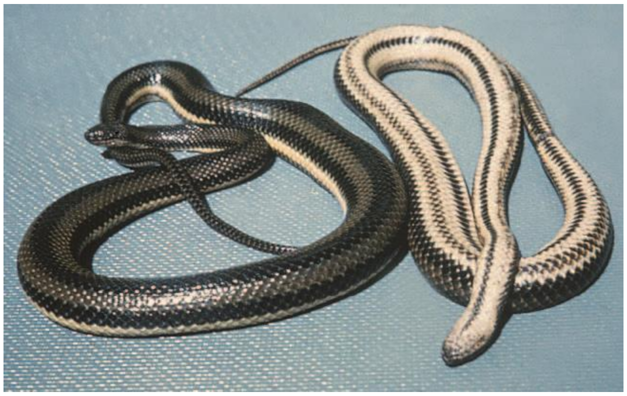
*Range*:
It is reported from sand desert in the Chagai area. The author collected two specimens from the Sulaiman Range, in western Punjab, Pakistan, in a rocky area.

### *8. Enhydris pakistanica* Mertens
(**Fig.10.12**)

1. Body stout, cylindrical, skin loose, scales at midbody 27-31, smooth and glossy.
2. Head small, slightly distinct from neck.
3. A pair of internasals, 1 pre- and 2 postoculars.
4. Supralabials 8, fourth in eye, 11 infralabials.
5. Ventrals small, not extending to full breadth of body, 156-164; subcaudals 75-92; anal 2-3.
   Snout-vent length 500-515 mm, tail 210-215 mm.

*Color*:
Dorsum light olive brown, with 3 black stripes,

median broadest. Ventrum and sides dirty white to yellowish. Head dark, chin and throat white clouded with brown.



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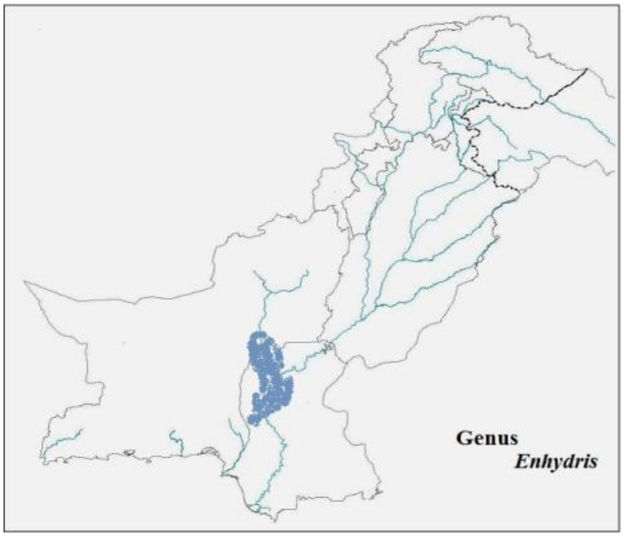


**B**

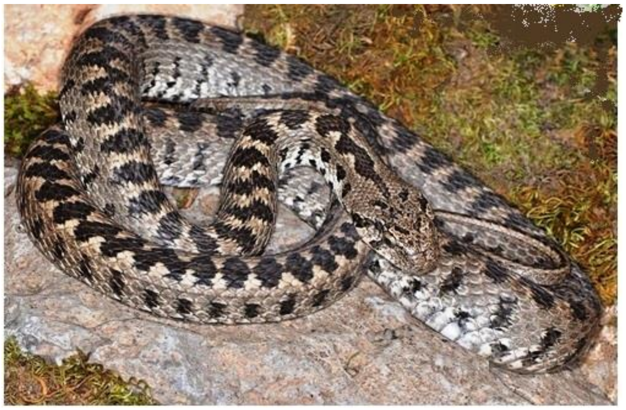
**Fig.10.12.** *Enhydris pakistanica* Mertens. B shows distribution of Genus *Enhydris* in different parts of Pakistan.

*Habitat*:
Frequents seepage pools along water channels. Ponds and ditches so formed are rich with emergent vegetation. This snake is almost entirely aquatic, not known to venture away from water.

*Range*:
Reported only from the Indus Delta in lower Sindh, Pakistan.

### *9. Hemorrhois ravergieri* Ménétriés (Fig.10.13)

1. Supralabials 9, fifth and sixth touching eye.
2. Anterior and posterior temporals both 3.
3. Scales at midbody 21, reduced to 15 just anterior of vent.
4. Ventrals 205-212, subcaudals 82-89.
   Snout-vent length 990-995 mm, tail 195-198 mm.



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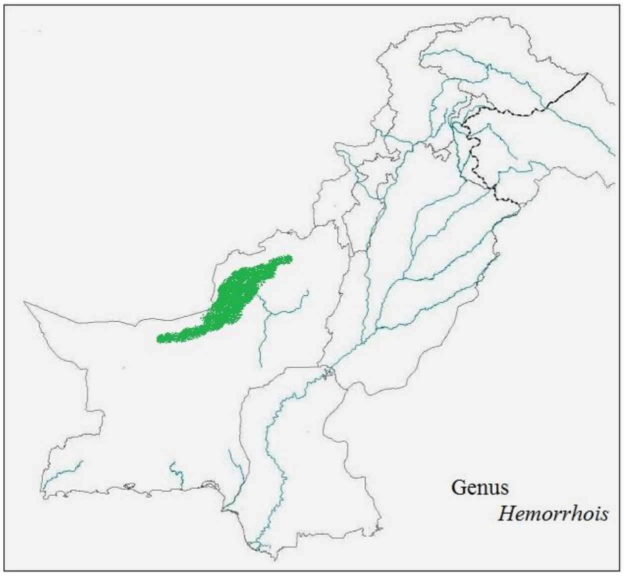


**B**

**Fig.10.13.** *Hemorrhois ravergieri* Ménétriés. B shows distribution of Genus *Hemorrhois* in different parts of Pakistan.

*Color*:
Dorsum light gray brown, with 61 olive vertebral transverse bars, alternating with lateral row of similarly colored spots, both tending to fuse at tail. Head with indistinct dark mottling, a dark bar from below eye to edge of mouth. Belly pale yellow to dirty white.

*Habitat*:
Inhabits sparsely forested rocky hillsides at 2000-4000 m of elevation. Diurnal, it feeds on lizards, eggs, amphibians, and mice.

*Range*: Extends from Transcaucasia to Israel to western Mongolia. In Pakistan it is recorded from mountainous areas in northern Balochistan to Chitral.

### ***10. Lycodon aulicus aulicus*** (Linnaeus)
(**Fig.10.14**)

1. Head depressed, snout spatulate, projecting beyond lower jaw.
2. Loreal elongated, in contact with internasals, not with eye.
3. Supralabials 10, third to fifth in contact with eye.
4. Smooth shiny scales, at midbody in 17 rows.
5. Ventrals 171-214, laterally angulate, subcaudals 55-83, anal divided.
   Snout-vent length 780-785 mm, tail 143-148 mm.

*Color*:
Dark brown to grayish brown dorsum, with slight gloss. Light crossbars 10-20, expanding laterally, and enclosing triangular patches of original body color. Jet black slightly protruding eye, pupil invisible. Upper lip and ventrum white.

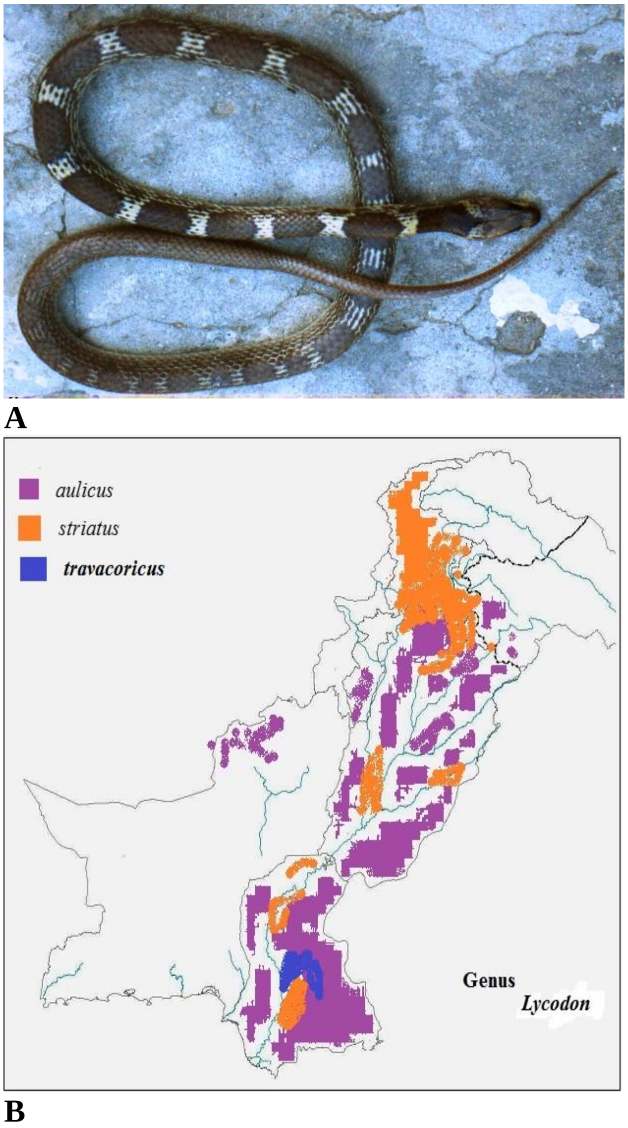


**Fig.10.14.** *Lycodon aulicus aulicus* (Linnaeus**)**. B shows distribution of Genus *Lycodon* in different parts of Pakistan.

*Habitat*: Collected from under piles of broken bricks partially covered with soil and debris. It frequents bush forests with mesic to dry environs and often enters human habitations, hiding under household articles.

*Range*: Widely distributed throughout India, Sri Lanka, Nepal, Assam, and Myanmar. In Pakistan it has rather spotty Range, reported from different localities in Sindh, Lahore and Rabwah, District Jhang, Pakistan.

### ***11. Lycodon striatus*** (Shaw)
(**Figs.10.15 & 10.14B**)

1. Loreal in contact with internasals.
2. One pre- and 2 postoculars.
3. Supralabials 8-9, fourth and fifth in eye; infralabials 9-10.
4. Scales smooth in 17 midbody rows.
5. Ventrals 173-205; subcaudals 40-60. Snout-vent length 400-405 mm, tail 90-95 mm.

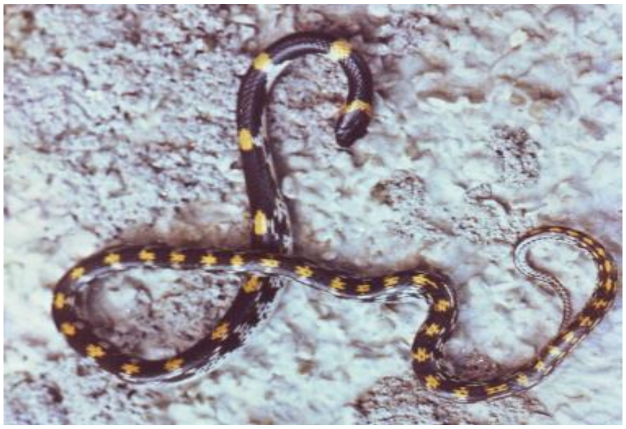


**Fig.10.15.** *Lycodon striatus* (Shaw)

*Color*:
Dorsum light dull brown, with 15-23 white or yellow crossbars from nape to the base of tail, alternating with similarly colored spots or dashes. Nape dark, ventrum white.

*Habitat*:
Collected from both cultivated land and open fields with sparse bushes in mesic habitat.

*Range*:
It ranges from Chota Nagpur in the east throughout India and Sri Lanka. In Pakistan it is collected from different localities in Punjab, Sindh, Balochistan, and Khyber Pakhtunkhwa. Extends westward to Transcaspia and Central Asia. In Pakistan its two races are distinguished as follows:

*Race 1*:
***Lycodon striatus striatus*** (Shaw)

Dorsum black to light chocolate brown with 16-21 light crossbars.
1. Subcaudals 45-60.

*Range***:**
Mainly the Indus Valley and along the coastal strip**.**

*Race 2*:

### ***12. Lycodon striatus bicolor*** (Nikolsky)
(**Fig.10.16**)

1. A distinct light band on nape.
2. Golden yellow (light in preserved specimens) transverse bars 35 or more, from nape to level of vent.
3. Subcaudals 50-70.

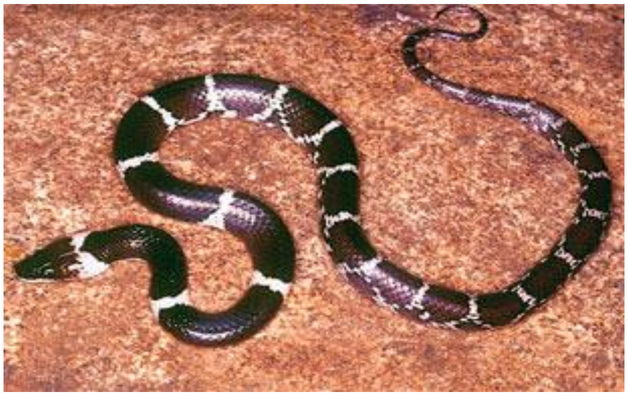


**Fig.10.16.** *Lycodon striatus bicolor* (Nikolsky)

*Range***:**
It occupies northwestern part of the range of the species, extending into Pakistan from upland Balochistan and Waziristan, Khyber Pakhtunkhwa.

### ***13. Lycodon travancoricus*** (Beddome)
(**Figs.10.17 & 10.14B**)

1. Head distinct from neck.
2. Loreal not in contact with internasals and eye.

3. Supralabials 9, third to fifth in eye in eye.
4. Scales smooth, 17 at midbody.
5. Ventrals laterally angulate, 162-206; subcaudals 64-78, anal not divided.
   Snout-vent length 630 mm, tail 130 mm.

*Color*:
Dark purplish dorsum, with a median row of 28-32 yellow crossbars from nape to level of vent. Bars bifurcate on sides enclosing triangular spots of body color. Ventrum white.

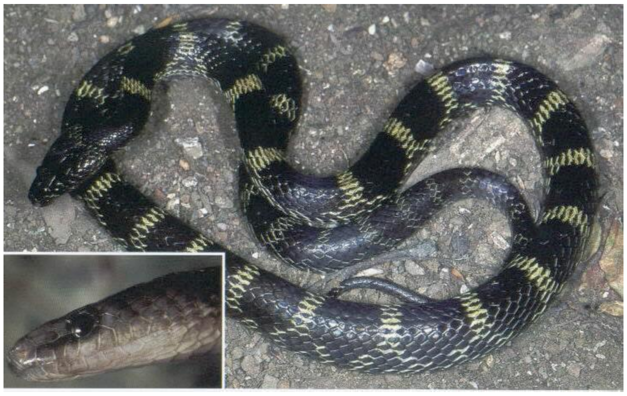


**Fig.10.17.** *Lycodon travancoricus* (Beddome)

*Habitat*:
Reported from the garden of Hyderabad College, Sindh. Nothing is known of its habitat and habit in Pakistan.

*Range*: From southern India. In Pakistan it has been reported once from Hyderabad, Sindh.

### *14. Lytorhynchus maynardi* Alcock and Finn (**Fig.10.18**)

1. Head long, slightly distinct from neck, snout sharply pointed.
2. Scales smooth, at midbody 19.
3. Rostral extends on top of head, separating internasals from each other almost completely.
4. Loreal present.
5. Eyes large, bordered by 7-8 circumocular scales, no supralabial in contact with eye, pupil round.
6. Supralabials normally 7, occasionally 6 or 8; infralabials 9-11.
7. Mental with a small anterior projection fitting into a notch at the base of rostral.
8. Ventrals 186-202, subcaudals 52-65.
   Snout-vent length 200-205 mm, tail 56-60 mm.

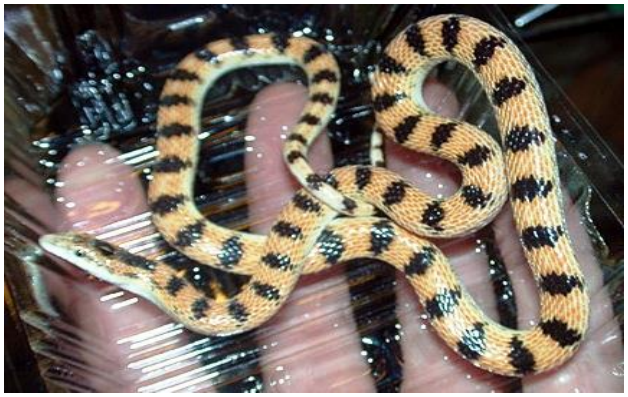


**Fig.10.18.** *Lytorhynchus maynardi* Alcock and Finn.

*Color*:
Dorsum pale orange to pinkish, with 35-47 black crossbars on body and 12-15 on tail. There is an alternating lateral series of dark spots. A characteristic elongated thick dark median stripe from frontal to nape. A dark postocular stripe. Ventrum white.

*Habitat*:
This sand snake has been collected from fine windblown sand dunes. It burrows in sand with the help of its pointed snout, usually close to roots of bushes and other vegetation. It is nocturnal, feeding on small lizards and arthropods; the prey is constricted. It is bad tempered and does not easily allow handling; it coils defensively, setting its neck in an S-shaped loop, attacks rapidly, all the while vibrating its tail (Minton 1966).
It breeds from March to May; 2-4 elongated eggs are laid.

*Range*:
This is a characteristic snake of windblown sand dune habitat of western Balochistan. It has been recorded from Nushki to eastern Iran in the west.

### ***15. Lytorhynchus paradoxus*** (Günther)
(**Fig.10.19**)

Morphologically close to the preceding species, differing from it in the following characters:

1. Snout less projecting.
2. Supralabials 8, fifth touching eye; 10-11 infralabials.
3. Ventrals 169-185, subcaudals 40-53; anal divided.
   Snout-vent length 360-375 mm, tail 63-67 mm.

*Color*:
Dorsum brownish gray, with a median series of 40-52 brown to sooty blotches, as broad as or broader than interspaces, alternating with a lateral series of smaller spots. Head top with an elongated dark blotch and a dark postocular stripe, ventrum white.

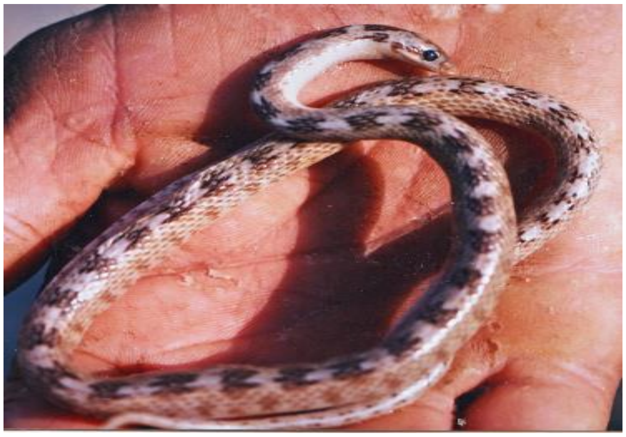


**Fig.10.19.** *Lytorhynchus paradoxus* (Günther)

*Habitat*:
The nominal species frequents sand deserts with sparse vegetation of grass and bushes. Feeding on small lizards, young mice, and arthropods. When alarmed, it throws itself into a ball, hiding its head and vibrating its tail and does not attempt to bite. Sensing that it is out of danger, it quickly dives into sandy soil, making its way by its projecting snout.

It breeds from March to May; 2-4 elongated eggs are laid in burrows at roots of bushes or under a stone.

*Range*:
This sand snake extends from the Thar Cholistan, deserts and Thal Deserts in northwestern Punjab, Pakistan (Khan, 1999e).

### ***16. Lytorhynchus ridgewayi*** Boulenger
(**Fig.10.20**)

1. Snout long, sharply pointed.
2. Rostral extends onto head, almost completely separating internasals from each other.
3. A circumocular ring of 7-8 scales.
4. Supralabials 7-8, none in contact with eye.
5. Ventrals 170-190, subcaudals 40-55.
   Snout-vent length 505-510 mm, tail 80-87mm.

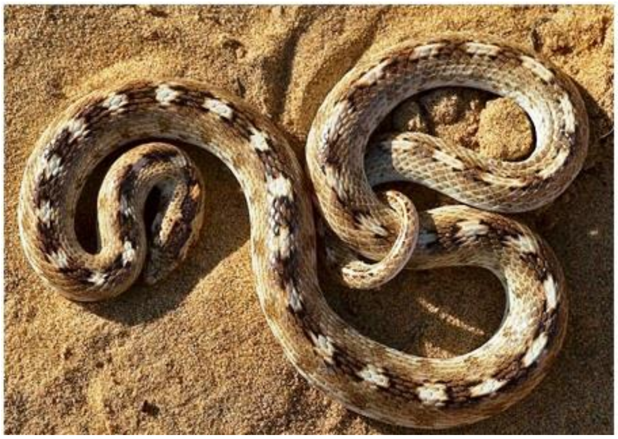


**Fig.10.20.** *Lytorhynchus ridgewayi* Boulenger

*Color*:
Pale gray to light brown dorsum, with a median

series of 40-49 blotches, which are anteriorly black to dark brown and posteriorly light brown with dark edges. A pair of lateral series of light brown spots. Head top with dark anchor-shaped mark, arms of which extend through eye to the angle of mouth. Ventrum of body white.

*Habitat*:
This little snake is characteristic of gravel fields with scrubby vegetation. It avoids open fields of windblown sand dunes, and keeps close to roots of vegetation. It is nocturnal and feeds on small lizards and arthropods; the prey is constricted and violently shaken before engulfing. When disturbed, its first reaction is to dive into soft soil; if on hard soil, it throws itself in coils hiding its head between the coils (Minton, 1966).
It breeds from March to July, 2-4 elongated eggs are laid in a recess in hard soil among roots of vegetation (Andrushko and Mikkau 1964).

*Range*:
This species extends to Transcaspia, central Iran, Afghanistan, and in Pakistan it is reported from western Balochistan up to an elevation of 2000 m.

### *17. Natrix tessellata* (Laurenti)
### (**Fig.10.21**)

Morphologically close to Xenochrophis *piscator*, however it differs from it as follows:
1. Internasals as long as or longer than broad, triangular, truncate in front.
2. Preoculars 2, rarely 1 or 3, with or without a subocular.
3. Supralabials 8, rarely 7.
4. Dorsal strongly keeled, in 19 midbody rows.
5. Ventrals 160-198, subcaudals 45-87.
   `Snout-vent length 760-768 mm, tail 150-156 mm.

*Color*:
Dorsum light green, olive gray, to almost black, with rows of small square alternating darker spots. Ventrum white, yellow, or orange-red. An inverted V-shaped dark mark on nape.

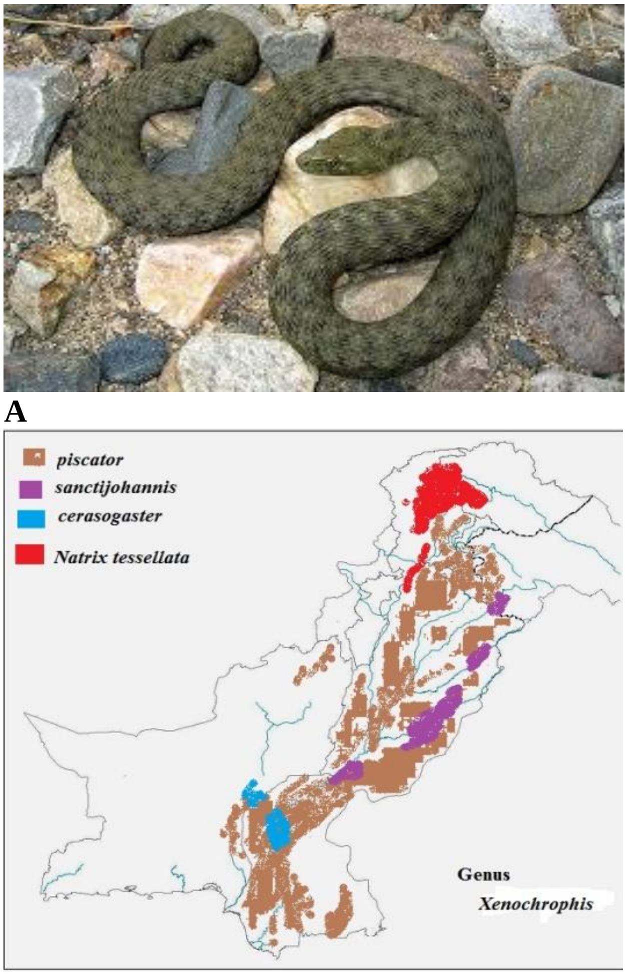


**Fig.10.21.** *Natrix tessellata* (Laurenti). B shows distribution of Genus *Xenochrophis* and *Natrix* in different parts of Pakistan.

*Habitat*:
*Inhabits water bodies, feeding on fishes and amphibians.

*Range*:
This snake is widely distributed in central and southeastern Europe to Western Asia, as far as Turkey, across southwestern Asia to Pakistan. It

has been reported from Iraq, Syria, and Jordan to the Nile Delta in Egypt.

### *18. Oligodon arnensis arnensis* (Shaw)
(**Fig.10.22**)

1. Head indistinct, snout blunt.
2. Rostral large, extends well on top of head, almost separating internasals.
3. Loreal may be present or absent.
4. One preocular, 2-3 postoculars.
5. Supralabials 7, third and fourth touching eye; 7 or 8 lower labials.
6. Anterior genial about three times longer than posterior.
7. Body scales smooth glossy, 17 at midbody.
8. Ventrals 175-195, subcaudals 48-57; anal divided.
   Snout-vent length 640-643 mm, tail 98-102 mm.

*Color*:
Dorsum reddish to dark brown, with 32-42 black crossbars, narrowly edged with white. Nape with a pair of V-shaped marks, extending backward. Ventrum white.

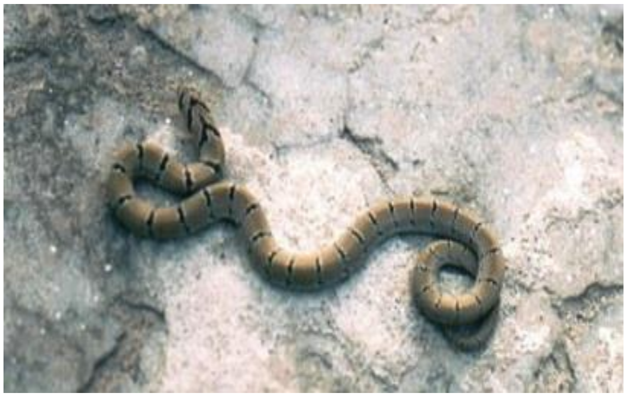


**Fig.10.22.** *Oligodon arnensis arnensis* (Shaw)

*Habitat*:
The brown kukri snake has been collected from mesic to semidesert habitat with bushy to dense forests. It lives in caves, crevices, and tree holes. It is common in hot weather, and is especially quite active at noon; otherwise, it is nocturnal, with a it has special liking for eggs, which it pierces with its specially enlarged posterior pair of upper teeth, the "Kukri" (dagger). The contents of the broken egg are sucked in, and the eggshell is disgorged (Minton and J. A. Anderson 1963; pers. obs.). The snake does not attempt to bite on handling.

It breeds from April to July; 3-8 hard-shelled eggs are laid which are glued to each other in a bunch. Juveniles are seen from June to September (Minton and J. A. Anderson 1963).

*Range*:
The barred kukri snake extends to East Bengal, central Nepal, central and peninsular India, and Sri Lanka. In Pakistan it has been reported from Sindh, throughout Punjab and southern Khyber Pakhtunkhwa.

### *19. Oligodon taeniolatus taeniolatus* (Jerdon)
(**Fig.10.23**)

1. Loreal present.
2. Scales at midbody in 15 rows.
3. Ventrals 190-218, subcaudals 29-58.
   Snout-vent length 580-590 mm, tail 89-73 mm

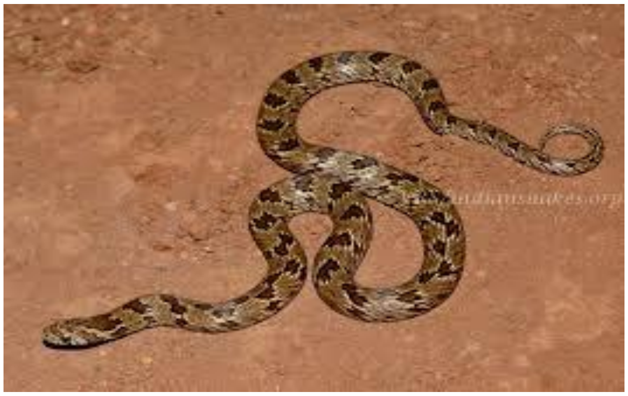


**Fig.10.23.** *Oligodon taeniolatus taeniolatus* (Jerdon)

*Color*:
Dorsum khaki to brown, with 36-47 narrow

irregular dark brown bands edged with white. A narrow vertebral and lateral dark brown stripe. Nape with W-shaped dark collar. A dark band across head at level of eyes. Ventrum white.

*Habitat*:

This snake has been collected from flat clay deserts, oases, and suburban gardens to elevations of about 200 m. It lives in crevices and holes in the earth, under stones and rocks, or in brick walls. It hides under piles of wood and trash in gardens. It is nocturnal; in hot weather it moves about just after sunset until dawn. When cornered it flattens against the substratum and puts its tail in a spiral.

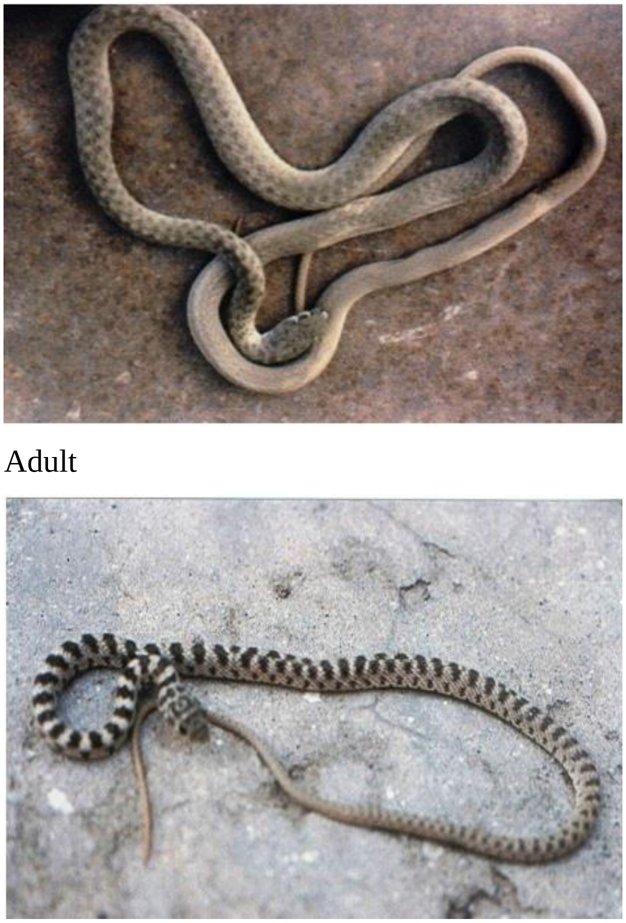
This snake feeds primarily on the eggs of lizards and snakes, even its own eggs. Larger eggs are punctured with the help of posterior dagger-shaped enlarged teeth which are brought into play by lateral kinking movements of the head and neck. The punctured egg is either collapsed so that its swallowing is facilitated, or the snake gains entry to consume its contents by thrusting its head into it. Smaller eggs are engulfed whole (Minton and J.A. Anderson 1963). Except for small lizards and arthropods, no other animal is taken. It breeds from March to August; 4-8 hard-shelled eggs glued in a bunch are laid in some secluded place.

*Range*:

The streaked kukri snake has been recorded from Bihar, throughout India and Sri Lanka. In Pakistan it has been recorded throughout the plains from Rawalpindi to Las Bela, at low altitudes (Khan 1993a).

### *20. Platyceps rhodorachis* (Jan)
### (**Fig.10.24**)

1. Body slender, head distinct.
2. Supralabials 9, rarely 8, fifth and sixth in eye; infralabials 9 or 10, rarely 11.
3. Ventrals 206-220, subcaudals 125-140. Snout-vent length 947-1055 mm, tail 164-170 mm.



Adult

Juvenile

**Fig.10.24.** *Platyceps rhodorachis* (Jan)

*Color*:

Dorsum pale to dark gray, with brownish short median cross bars formed of 4 rows of alternating roundish spots, posteriorly unicolor. Head brownish, with lighter pre- and postoculars. Ventrum white, with dark speckling on lateral sides.

*Habitat*:

The cliff racer prefers stony highland, with sparse grass and bushes, and extends from sea level to 350-3000 m of elevation. It inhabits holes and narrow crevices among rocks, or burrows of rodents and lizards.

*Range*:

Wide range in the west, from Turkmenistan, Syria, Iraq, Iran, Saudi Arabia, and extends to Somalia. In Pakistan it is recorded from Balochistan, and is common around Karachi (Minton 1966). However, it does not extend in plains of Punjab.

### *Platyceps rhodorachis ladacensis*

(J. Anderson)

(**Fig.10.24**)

1. A typical *rhodorachis* with a red middorsal line.

**Taxonomic notes**

Unaware of Jan's (1865) description, Anderson (1871) described Zamenis *ladacensis* from Ladakh, Baltistan. Later, he (1895) compared *rhodorachis* with ladacensis and found them identical. Despite proven conspecificity, a *rhodorachis* with a pinkish red median dorsal (Nikolsky, 1916), drab, light orange to vermilion (Minton 1966), red (Mertens, 1969a) vertebral line is regarded as *ladacensis*. The "colored vertebral line" is discernible only in a living snake; it is soon lost upon preservation and the identity of taxa is confused. It is why the validity of *ladacensis*, as a separate taxon, has always been questioned (Kramer and Schnurrenberger 1963; Leviton and Anderson 1961; Kral 1969; Ataev 1985; Mertens 1969a). *Platyceps rhodorachis ladacensis* is an alpine race; it has never been collected from Punjab highland. It appears to be simply a color variant, however, I recognize it as a subspecies until more material is available from its type locality.

*Range*:

Minton (pers. comm. 1998) records the uniform gray form of *rhodorachis*, with orange or red vertebral stripe, as common in Quetta (Balochistan) and Peshawar (Khyber Pakhutunkhwa).

### *Platyceps rhodorachis kashmirensis*

(M.S. Khan and A.Q. Khan)

(**Fig.10.25**)

Infralabials almost always 10 in number.

1. Dorsals almost always reduced to 13 at vent.
2. Supralabials 9, fifth, sixth in eye, rarely fourth and fifth.
3. Single preocular and presubocular, 2 postoculars.
4. Posterior genials are separated by a patch of 5-8 granular intergenial scales, which are sometime arranged in a double row. Ventrals 210-239 mm, subcaudals 119-135. Snout-vent length 385-660, tail 190-228 mm.

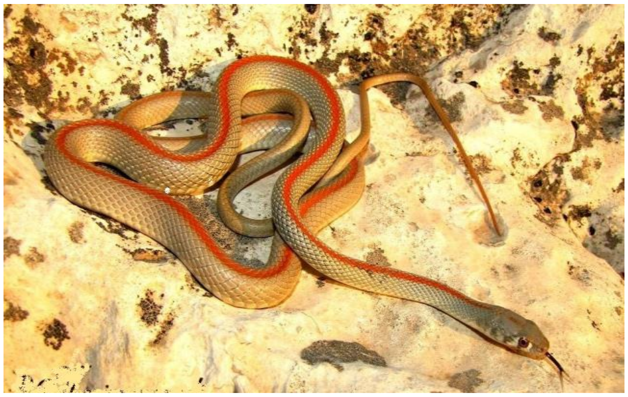


**Fig.10.25.** *Platyceps rhodorachis kashmirensis*

*Color*:

Head and anterior half of the body dark without light spotting, except a pre- and postorbital bar. On the side of neck a series of 2-4 roundish dark spots with white ocelli. Posterior half of the body lighter with irregular dark dashes formed by the black pigment deposited between scales. Ventrum dark, pigment especially deposited between ventrals.

*Habitat*:

It lives in submountainous stony habitats with hard reddish soil, cut into ravines and gullies.

Alpine vegetation consists of grasses, pine trees, and hedges.

The snake was collected from under stones and slabs. It forages around, feeding mostly on skinks and other lizards. It usually climbs in trees and thatched roofs to feed on eggs and nestlings.

*Range*:

Southern Azad Kashmir, Mirpur, Bhimbar, Dulliah Jattan, Kotli, Goi Madan, Aram Bari, Palandri, Punch, Bagh, and Muzaffarabad.

### *21. Platyceps ventromaculatus ventromaculatus* (Gray and Hardwicke)

(**Fig.10.26**)

1. Body moderately robust, cylindrical with even taper.
2. Supralabials 9, rarely 8, fifth and sixth touching eye; infralabials 9 or 10, rarely 11.
3. Ventrals 195-213, subcaudals 97-115. Snout-vent length 1090-1100 mm, tail 205-212 mm.

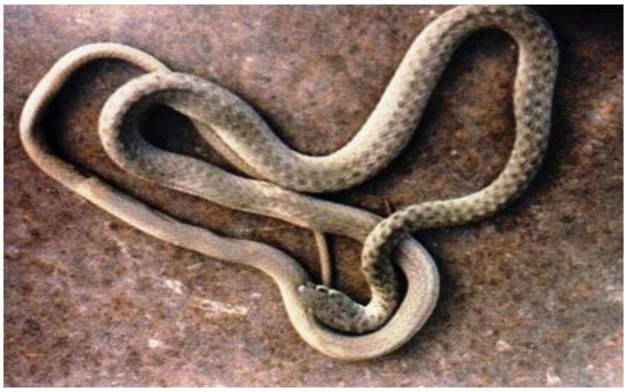


**Fig.10.26.** *Platyceps ventromaculatus ventromaculatus*

*Color*:

Sandy white or light reddish brown, with a median series of 57-76 crossbars formed of gray scales edged with black, alternating with one or two lateral series of spots, the outermost touching tips of ventrals. Dorsal pattern fades out in posterior one-third of body. Head with symmetrical dark mottling on top. Ventrum glistening white.

## Races

### *1. Platyceps ventromaculatus bengalensis*

(M.S. Khan and **A.**Q. Khan)

Supralabials 9, fifth to sixth in eye, 10-11 infralabials. Ventrals 220-230, 69-70 subcaudals. A median dorsal row of 60+, 1-2 scale thick dark cross bands, much narrower than interspaces, replaced on tail by irregular narrow transverse streaks formed by approximation of dark edges of adjacent scales. Distinct orbitolabial and temporal stripes.

A rare snake.

### *2. Platyceps ventromaculatus indusai*

(M.S. Khan and A.Q. Khan)

(**Fig.10.27**)

Supralabials 8-9, fifth (rare) usually fifth to sixth in eye. Preoculars 2, 2-3 postoculars (rarely 1).

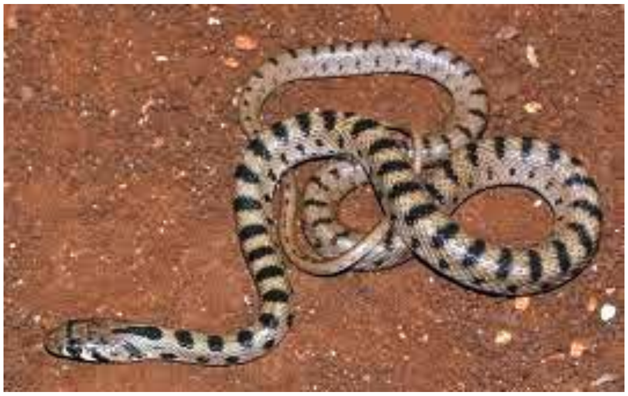


**Fig.10.27.** *Platyceps ventromaculatus indusai*

Ventrals 195-220, subcaudals 82-119.

Dorsum grayish white to pale sandy. Head with indistinct dark mottling. Body with a median row of 3-4 scale thick 50-70 rhombs or saddles, broader than interspaces, alternating with two lateral rows of spots, outermost row of smaller spots usually touching ventrals. A 2-4 scale thick nuchal streak always flanked by large temporal blotch, which obscures oculotemporal streak. The sooty pigment is confined to scale's periphery.

*Habitat*:

Frequents grasslands, forests with alluvial soil and moderate scrubby vegetation, except humid areas along water courses. Primarily terrestrial, climbs into low bushes and roofs of thatched houses for eggs and nestlings.

*Range*:

Widely distributed in the Indo-Gangetic plains, below 200 m. Extends westward to Uzbekistan and Israel.

### ***22. Psammophis condanarus condanarus***

(Merrem)

(**Fig.10.28**)

1. Head long, narrow, distinct from neck, snout blunt, eyes large.
2. Loreal scale elongate, twice long as high.
3. One pre- and 2 postoculars, preocular not in contact with frontal.
4. Nasal incompletely divided.
5. Supralabials 8-9, fourth and fifth in eye; infralabials 11.
6. Midbody scales 17.
7. Ventrals 165-179, subcaudals 83-93; anal divided.
   Snout-vent length 800-825 mm, tail 254-258 mm.

*Color*:

Dorsum pale olive to yellowish. A pair of dark brown stripes on fifth and sixth scale rows does not extend to head. Reddish brown stripes on l-3 scale rows, extends on head passing through eye and snout. Lateral interstripe space cream to straw yellow. Supralabials greenish, green color extends posteriorly as a band on lateral tips of ventrals, ventrum medially cream, margined with a narrow reddish brown stripe.

*Habitat*:

Frequents mesic habitat with long grass and sparse bushes. Diurnal, very agile, and moves very fast. In danger, it freezes and its light color makes it inconspicuous in dry yellow grass in daylight. Climbs into bushes and smaller trees.

*Range***:**

Known from western Bengal, Orissa to Bombay, Sindh, and Punjab. Pakistan records are from Jacobabad, Lahore, and the Indus Delta. In the western Himalayas it is one of the commonest snakes at altitudes between 1000 and 2000 m.

### ***23. Psammophis leithii leithii***

(**Fig.10.28**)

1. Preorbital contacts frontal.
2. Temporals 1 + 2.
3. Supralabials 8-9, fourth and fourth in eye; infralabials 9-10.
4. Nasal divided.
5. Posterior genial a little longer than anterior.
6. Ventrals 164-187, subcaudals 104-109; anal not divided.
   Snout-vent length 770-778 mm, tail 225-230 mm.

*Color*:

Ground color yellowish, darker on sides. A pair of dark to brown stripes starting from internasals and continuing along body occupying fifth to seventh scale rows becomes wider at midbody and fusing on tail. The dark lateral color of body forms a stripe, confined on first and second scale row, lateral tips of ventrals white, central part lemon yellow. Head top with median dark, longitudinal stripe, another stripe through eyes. Labials cream with reddish brown mottling, reddish brown spots on neck.

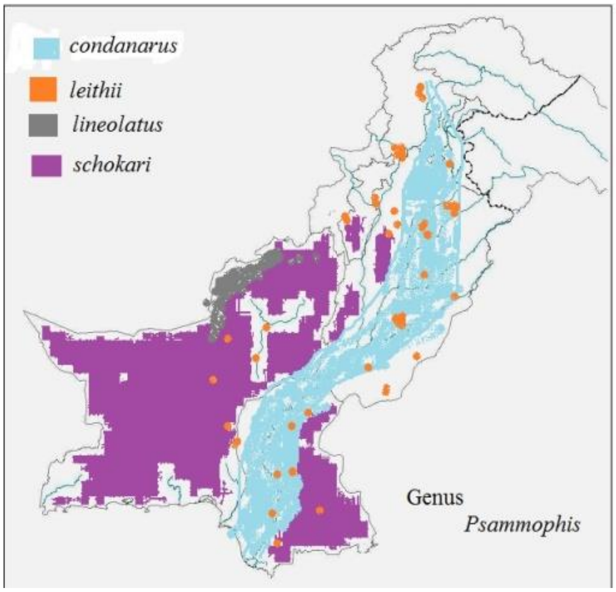


**Fig.10.28.** *Psammophis leithii leithii*

*Habitat*:
Frequents desert grassland with scrubby vegetation near marshy areas in lower Sindh. It extends into clay deserts along the sea coast. Habitats of all the three ribbon snakes of Pakistan overlap in the deserts of Pakistan.

*Range*:
Ranging from the United Provinces of India, Poona to Waziristan and southeastern Balochistan, in the west. In Pakistan it is recorded from Azad Kashmir, the Thar, Cholistan, and Thal Deserts to Kalat District in Balochistan, below 800 m of elevation. It is fairly common in Indus delta.

### *24. Psammophis lineolatus lineolatus* (Brandt)

Steppe ribbon snake: *Patta teer-mar*
(**Figs.10.29 & 10.28**)

1. Preocular touching frontal.
2. Temporals 2 + 2 or 3.
3. Supralabials 9, fourth to sixth touching eye; 9 infralabials.
4. Midbody scale rows 15.
5. Nasal divided.
6. Ventrals 174-190, subcaudals 70-90; anal divided.
   Snout-vent length 875-900 mm, tail 190-194 mm.

*Color*:
Dorsum light grayish buff, a pair of dark stripes from eye running along the length of body. At midbody a medium brown stripe, with several black-tipped scales. Head with a median dark stripe. Labials cream, with reddish brown mottling. Central part of belly lemon yellow, with median stippling and a dark line at lateral tips of ventrals.

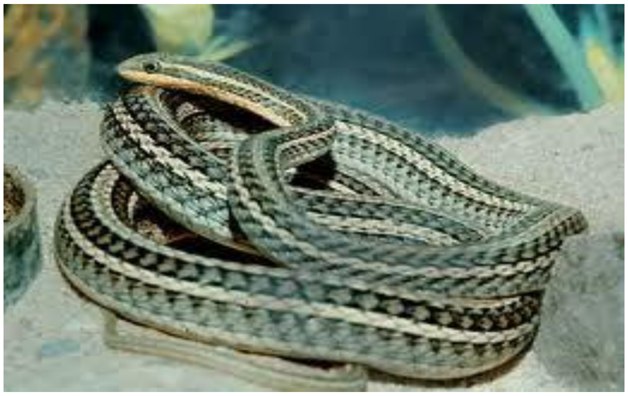


**Fig.10.29.** *Psammophis lineolatus lineolatus* (Brandt)

*Habitat*:
This snake inhabits scrublands in sandy deserts or close to foot hills. Near Quetta it is recorded at 1500-2100 m (Minton 1966).

Food consists mainly of sand lizards and arthropods. It is diurnal, oviparous; 8-10 eggs are laid from March to July, under stones or burrows of rodents and lizards.

*Range*:
It is a central Asian species extending from Transcaspia to northern Iran, east to Mongolia

and northwest China. In Pakistan it has been recorded around Quetta, Balochistan.

### *25. Psammophis schokari schokari* (Forskål)

Saharo-Sindhian ribbon snake: *Saharae teer-mar*)
(**Figs.10.30 & 10.28**)

1. Anterior end of frontal just touching preorbital.
2. Temporals 2 + 2 or 3.
3. Supralabials 9, fifth and sixth in eye; 10 to 11 infralabials.
4. Both genials equal in size and in contact with each other.
5. Midbody scale rows 17.
6. Ventrals 173-186, subcaudals 118-130; anal divided.
   Snout-vent length 1285-1290 mm, tail 460-465 mm.

*Color*:
Color of this snake is very variable: dorsum light olive, chestnut, dark brown, or gray. Head top with symmetrical dark markings; a dark stripe from snout through eye; labials white, flecked and spotted black; central part of belly usually bluish gray, occasionally reddish or almost black.

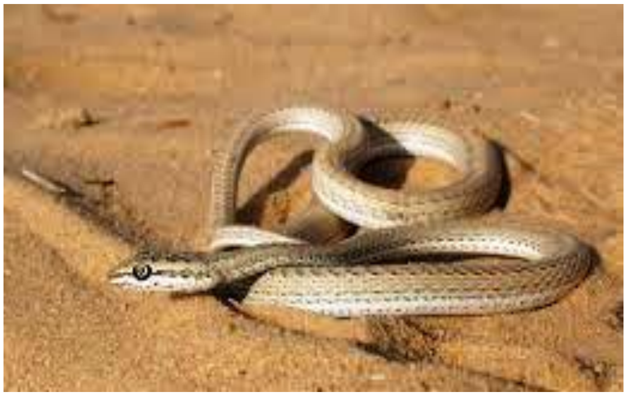


**Fig.10.30.** *Psammophis schokari schokari* (Forskål)

*Habitat*:
This snake inhabits sand deserts with sparse grass and occasional bushes. It lives in lizard or rodent burrows at the roots of bushes or under rocks. It climbs in branches of bushes to bask in the sun, or to avoid heat during the hottest hours.

It is a diurnal, alert, speedy, and very agile snake, and to capture one uninjured is difficult. It feeds on various species of sand lizards and rodents. It breeds from March to July; 4-10 eggs are laid in burrows.

*Range*:
Geographical range of *P. schokari* is continuous across northern Africa through Somalia, through southwestern Asia to Soviet Central Asia, Balochistan, and Sindh (Marx 1988). It extends in Cholistan and Thal Deserts of Punjab, Pakistan (Khan 1987).

### *26. Pseudocyclophis persicus* (J. Anderson)

(**Fig.10.31**)

1. Head long slightly distinct from neck, body slender.
2. Loreal scale generally absent, if present very small.
3. Eyes small, round pupil, not distinct in life.
4. Single pre- and postocular.
5. Supralabials, third and fourth in eye; 7-8 infralabials (Figure 27C).
6. Dorsals smooth, 13-17 at midbody, with apical pits.
7. Ventrals 206-238, subcaudals 75-99.
   Snout-vent length 380-390 mm, tail 107-110 mm.

*Color*:
Dorsum light brown, scales at base dark. Sometimes unicolor or with a neural series of 50-65 narrow transverse dark bars which become broader and fainter posteriorly. Head uniformly gray to dark from snout to nape, with a postorbital light transverse band, another crossing tips of parietals, ventrum cream.

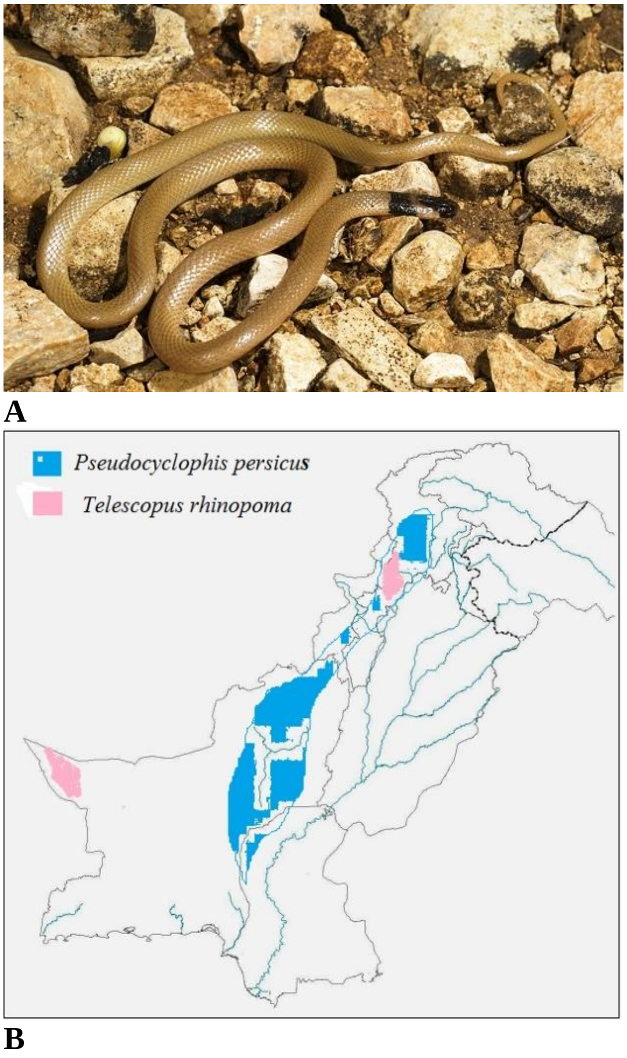


**Fig.10.31.** *Pseudocyclophis persicus* (J. Anderson)

*Habitat*:

The dwarf racer frequents rocky and hilly terrain with xeric to mesic environments with scrubby to forest vegetation. It is very agile retreats into crevices among rocks, and is nocturnal. It is found usually hiding under stones and rocks during the day.

Food includes small lizards, while arthropods are frequently taken. It breeds from April to June; 4-8 oblong eggs are laid in crevices.

*Range*:

The dwarf racer has been reported from Turkmenistan, Iraq, and Iran. In Pakistan it is reported from Balochistan, western Sindh to Swat in the north.

### ***27. Ptyas mucosus mucosus*** (Linnaeus
(**Fig.10.32**)

1. Large snake with elongated head, distinct from neck, snout blunt.
2. Loreal concave, loreal 2-4, usually 3.
3. Preoculars 2 and 2-3 postoculars (Figure 27A).
4. Nostril between nasals and first supralabial; internasals shorter than prefrontals.
5. Supralabials 8, fourth and fifth touching eye, 9 or 10 infralabials.
6. Temporals 2 + 2.
7. Median rows of dorsals distinctly keeled, 17 rarely 19 at midbody.
8. Ventrals 190-197, subcaudals 110-117, anal divided.
   Snout-vent length 2250-2260 mm, tail 550-560 mm.

*Color*:

Dorsum gray to dark olive brown. Edges of most of the scales of body light, dark, or yellowish. Labials and scales of lateral sides of body dark-edged. Belly yellowish white, free edges of ventrals and subcaudals dark.

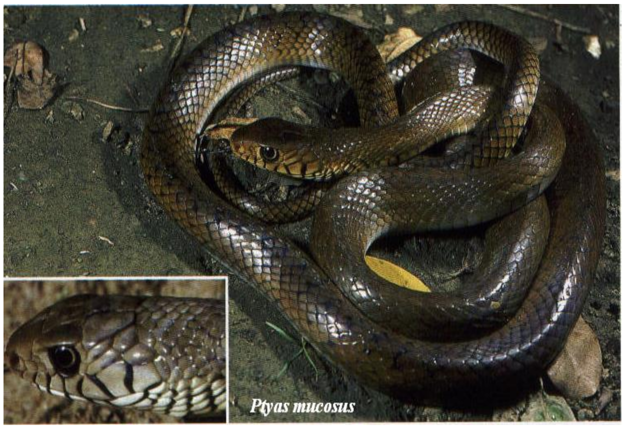


**Fig.10.32.** *Ptyas mucosus mucosus* (Linnaeus

*Habitat*:

The dhaman snake frequents damp and marshy situations along water courses, grasslands, cultivated land, gardens, mango groves, forests, mesic hilly environs, etc. It is attracted into human settlements by the rodent population. It often invades houses and lives in rodent holes. Its loud and resonant hiss is sufficient to chill the hearts of inhabitants. Due to its large size and dorsal body color, it is generally mistaken for *Naja naja*. It is a good swimmer, and climbs into branches of trees and roofs of thatched houses, attracted to bird's nests. Occasionally its presence is indicated by flocks of calling birds. It is a diurnal, alert, and active large snake; when on the prowl, it moves about in search of food. When cornered, its first priority is to slip away, however, if cornered it coils its body and hisses loudly, lunging furiously emitting a loud growling hiss (Abdulali 1935). Its bite is painful but nonvenomous.

Wall (1906) describes its feeding habits, "The dhaman is very catholic in its taste, devouring almost anything that chance brings within its reach, but it displays a very marked partiality to a batrachian diet, doubtless because toads, and more especially frogs, are extremely plentiful, easily captured, and too defenseless to offer much resistance. The possibility of taste influencing its selection may be dismissed, since flesh, however toothsome, must fail to impart its relish when clothed in feathers, fur, or integuments". Diet of the dhaman consists mainly of lizards, birds, eggs, rodents, and frogs. Wall (1906) includes a young soft-shell turtle (*Aspideretes*) in its diet. Its voracity is recorded by the same author by quoting examples of a specimen who that have consumed 18-22 full sized *Euphlyctis cyanophlyctis*. The snake is known to press the struggling prey against the ground with its body while devouring it (Wall 1906). It is known to be cannibalistic and ophiophagus.

It is not killed by the local peoples because it is known to exterminate rats from village houses and barns. In Punjab and Sindh it hibernates from December to February.

The dhaman breeds from March through August. During August and September 8-16 oblong eggs (50 x 40 mm) are laid in burrows, or under some protected shelter which gets sufficiently warmed by the sun to keep the eggs at an optimum temperature. Juveniles hatch between September and December, and are very secretive and alert (Daniel 1983).

*Range*:

The range of dhaman is quite extensive in Southeast Asia; from Java, Sumatra, Viet Nam, and China, it extends throughout India, the Andaman Islands, Sri Lanka, Pakistan, Iran, and Afghanistan. It particularly avoids deserts throughout its range. It is common at moderate elevations of 200 m; however, it has been recoded about 1600 m of elevation near Quetta (Minton pers. comm. 1983).

### ***28. Sibynophis sagittarius*** (Cantor)

(Golden snake: *Sunahra saamp*)

(**Fig.10.33**)

1. Supralabials 7-8, third and fourth or third to fifth in eye.
2. Single anterior temporal touching fifth, sixth, and seventh supralabial.

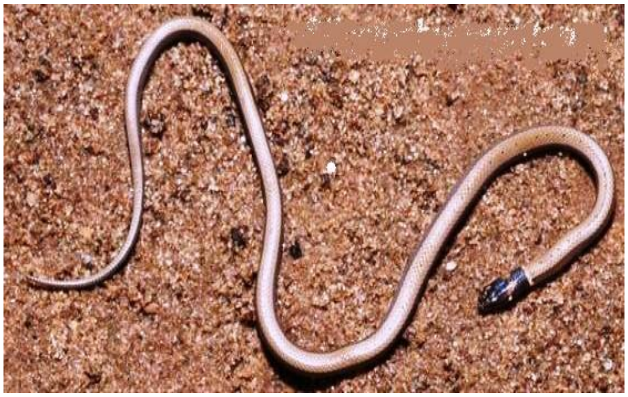


**Fig.10.33.** *Sibynophis sagittarius* (Cantor)

3. Ventrals 197-238; subcaudals 54-70.
4. Total length 350 mm, tail 93-112 mm.

*Color*:
Dorsum light brown. A vertebral series of black dots. Head and nape dark brown or black, with a large elongated oval yellow patch on each side of the back of the head. Snout variegated with yellow. Ventrum yellow, a dark dot on the outer edge of ventrals.
`

*Habitat*:
The only specimen of this snake was recorded from Dulliah Jattan, southern Azad Kashmir, from under a rocky slab.
The terrain is stony with hard soil. Vegetation is sparse of grasses, with occasional low bushes.

*Range*:
Western Himalayas; Ganges basin, lower Bengal (Mahendra, 1984). It has recently been recorded from southern Azad Kashmir (A. Q. Khan and M. S. Khan 1996).

### *29. Spalerosophis arenarius* (Boulenger) (**Fig.10.34**)

1. Prefrontal broken into 3-6, usually 4 scales, arranged in a transverse series.
2. Snout pointed, rostral extends well on top of snout separating internasals from each other, more than length of suture between them.
3. Loreal 2, one behind other.
4. Scales in circumocular ring 6-8.
5. Supralabials 9-11, infralabials10-12.
6. Scales keeled, 25 rows at midbody.
7. Ventrals 226-257, subcaudals 71-86, anal not divided.
   Snout-vent length 930-935 mm, tail 175-180 mm.

*Color*:
Dorsum grayish to reddish brown, with seven series of alternating reddish spots of various sizes, those of median series largest, 54-72 from nape to the base of tail, where they tend to fuse in longitudinal stripes. Ventrum glossy white.

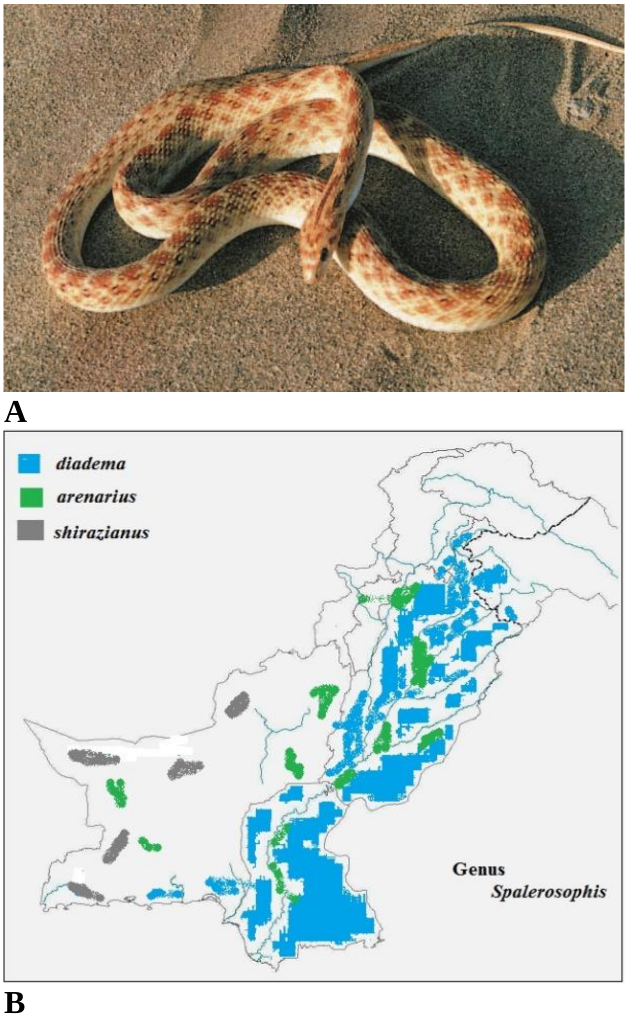


**Fig.10.34.** *Spalerosophis arenarius* (Boulenger). B shows distribution of Genus *Spalerosophis* in different parts of Pakistan.

*Habitat*:
This snake frequents sandy country with scrubby vegetation. It is nocturnal and feeds on various sand lizards, birds, field mice, and eggs. When cornered it hisses loudly and attacks. Wounds inflicted by it are painful.
It climbs into low bushes to feed on eggs and

nestlings. It breeds from March to June, 8-10 elongated eggs are laid in some protected place having optimum temperature and humidity.

*Range*:
Apart from Cholistan and the Thar Deserts, it has recently been reported from Dera Ghazi Khan and the Thal Desert in northwestern Punjab, Pakistan (Khan 1999a).

### ***30. Spalerosophis diadema*** **(**Schlegel**)**
(**Fig.10.35**)

1. Loreal two, one behind other.
2. Circumocular ring of 8-10 scales.
3. Prefrontal segmented in 5-8 scales, arranged in two transverse series.
4. Supralabials 10-13, infralabials 11-14.
5. Dorsals keeled, in 27-31 rows at midbody.
6. Ventrals 232-254, subcaudals 96-114, anal not divided.
   Snout-vent length 1220-1230 mm, tail 328-232 mm.

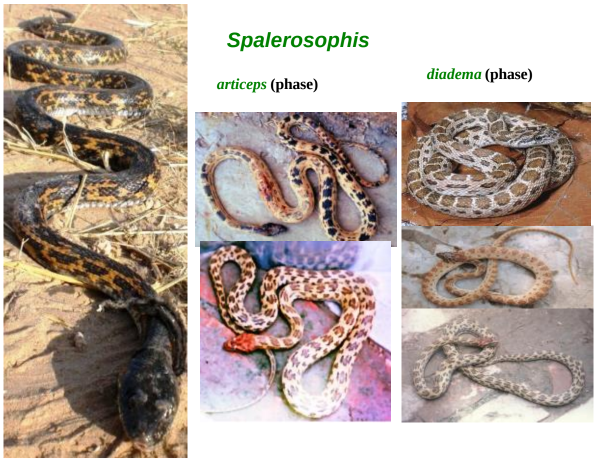


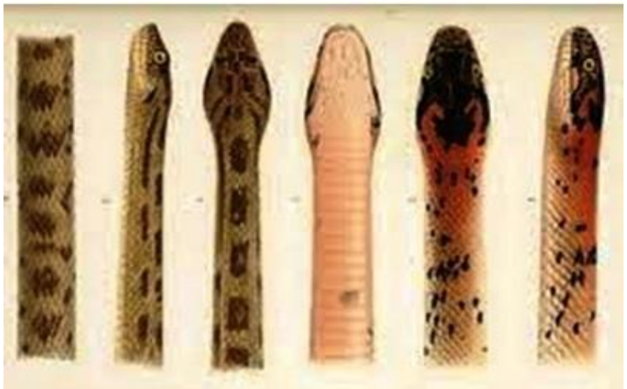
**Fig.10.35.** *Spalerosophis diadema* **(**Schlegel)

*Color*:
Color varies with age: young snakes are thin-bodied with a median row of dark brown large rhomboidal blotches on body, and an alternating lateral series of similar smaller spots. There is a dark bar between eyes, and an oblique stripe from behind the eye to the angle of mouth. Older specimens are thick-bodied, yellow dorsum with scattered dark brown or sooty black spots, usually confined to individual scales. Head either blood red with tinge of black or entirely sooty black. Ventrum deep red, visible through ivory white ventrals. A transitory color phase is observed in subadults. Melanistic adults are not uncommon (Mertens 1969a).

*Habitat*:
This large snake inhabits forests along water courses, and open fields with scrubby vegetation and moderately hard soil. In rocky area it lives in crevices in loose rock. It is the usual snake frequenting old uninhabited buildings with untended natural vegetation. It is often seen in groves, barns, and suburban gardens where it is attracted by rats, mice, and nesting birds. While in inhabited houses, it lives in rat holes and often climbs in roofs to feed on birds and their nestlings. It is a bad tempered snake; when cornered it hisses loudly and strikes repeatedly, biting savagely and inflicting a painful nasty bite.

It is nocturnal, however it is it is occasionally active during the day also. Its natural diet consists of frogs, rats, birds, eggs, and lizards.
It breeds from March to September; 3-12 eggs are laid in more than one clutch, each of 2-6 eggs measuring 68-78 x 16-28 mm.

*Range*:
The diadem snake has been recorded from sea level to 2000 m, in Gilgit, northern Pakistan; however, it is widely distributed throughout India, Bangladesh, and northern Sri Lanka. In Pakistan it has been recorded from throughout Khyber Pakhtunkhwa, Punjab, Sindh, and Balochistan.



**_Spalerosophis diadema “atriceps”_ phase**

Taxonomic notes:

Differs from *Spalerosophis diadema* in dorsal color and pattern which is highly variable. Dorsum is straw yellow to orange or dusky pink, with irregular black flecks and blotches, head black or red, mottled with red or black, shading to dark red on nape and temples. Belly peach to pink, immaculate or mottled with dark gray, chin and throat white (Minton 1966). However, Mertens (1969) has shown that *Spalerosophis diadema* changes its color and pattern to *atriceps* (Plate 142A) phase, as it grows old.

### ***31. Spalerosophis schirazianus*** (Jan)

(**Fig.10.36**)

1. Scales in ocular ring 8-10.
2. Prefrontals 6-9.
3. Dorsals smooth or with traces of keels, 25 or 27 at midbody.
4. Ventrals 231-244, subcaudals 78-79; anal not divided.
   Snout-vent length 975-980 mm, tail 195 mm.

*Color*:

Dorsum pale gray, yellowish khaki. A median series of 50-54 light olive to dark gray blotches. Head marking like young *S. diadema*. Ventrum white.

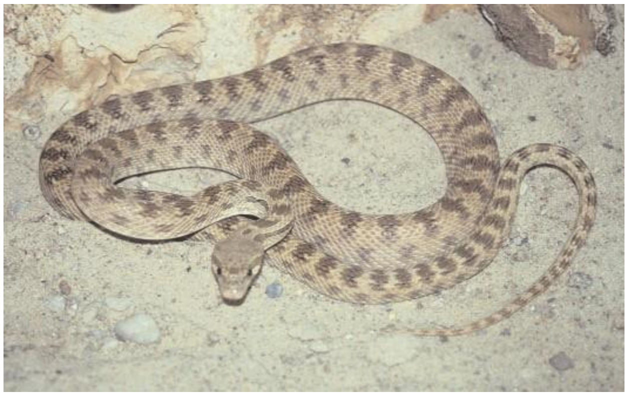


**Fig.10.36.** *Spalerosophis schirazianus* (Jan)

*Habitat*:

The Persian diadem snake frequents flat clay deserts with sparse vegetation. However, it extends into fruit groves hiding under fallen trees, leaf litter, in crevices and holes in the soil. It usually occupies burrows of lizards and field rats. It is primarily a nocturnal species; however, it is occasionally seen active during the day.

Food includes birds, eggs, lizards, and field rats. The snake climbs in low bushes in search of prey.

It breeds from March to August; 4-12 elongated eggs are laid in some protected place with optimum temperature and humidity.

*Range*:

It has wider range in the west, from Transcaspia to the Zagros Mountains in southern Iran and Tajikistan. In Pakistan it is at its easternmost Range range and has been recorded from western Balochistan and Las Bela (Khan, 1987).

### ***32. Telescopus rhinopoma*** (Blanford)

Desert cat snake: *Regasthani billi-chishm saamp*

1874 Dipsas *rhinopoma* Blanford, Ann. Mag. Nat. Hist. London 13:34.

*Type locality*:

Kirman, southern Iran.

*Diagnosis*:

1. Triangular head, distinct from neck, snout flat, broad.
2. Body cylindrical, slender.
3. Eyes large with vertical pupil.
4. Nostril small, in partially divided nasal, loreal elongate touching eye, single preocular in contact with frontal.
5. Anterior temporals 3, posterior temporals 3-4.
6. Supralabials 8-9, fourth to sixth in eye; 12 infralabials.
7. Dorsals smooth, oblique with apical pits, 23 at midbody reduced to 17 at vent, middorsals broader than laterals.
8. Ventrals 247-280, subcaudals 77-99, anal entire.
   Snout-vent length 830-840 mm, caudal length 160 mm.

*Color*:

Head sandy, with dark Y-shaped mark, stem of which with dark nuchal color. Body dorsum pale grayish, with a middorsal series of large dark brown squarish blotches, broader than interspaces, posteriorly median row of blotches may divide in 2 rows of spots. A lateral alternating series of smaller poorly defined spots. Ventrum dark brown.

*Habitat*:

A rare snake, it is nocturnal, taken from arid rocky hills at an elevation of 700 m. Related species of desert cat snake feed almost entirely on lizards (Minton 1966), and birds (Böhme, 1977).

*Range*:

South-central Iran to Waziristan. Kacha Thana, Balochistan (Wall 1914); Miranshah, Tochi Valley, Waziristan, Khyber Pakhtunkhwa. A specimen BMNH 94.210.4.4. from Sind is in the British Museum, London (Minton 1966). Böhme (1977) puts Sind in comas showing it in the northwestern Balochistan.

### ***33. Xenochrophis cerasogaster cerasogaster*** (Cantor)

Red-belly marsh snake: *Surakh dhoobi saamp*

(**Fig.10.21B**)

1. Head long, narrow, distinct from neck.
2. A pair of anterior and 3 posterior temporals.
3. Supralabials 8-9, fourth touches eye; infralabials 9-11.
4. Scales at midbody 19, weakly keeled, last 3-4 rows smooth.
5. Ventrals males 140-149, females 144-158; subcaudals paired, males 63-78, females 63-71, anal divided.
   Total length males 577-668 mm, females 924-973 mm.

*Color*:

Dorsum dark brown, olive, or russet, with a dull faint dorsolateral stripe. A bright yellow stripe along outermost scale row and lateral tips of ventrals, extending on to the lips and temporal region. Ventrum posteriorly purplish black, anteriorly becoming gray, heavily marbled with red. Chin and throat white, with red mottling.

*Habitat*:

This water snake avoids main water bodies, and confines itself to shallow quieter, side pools with much emergent vegetation. It often rests on the edge of the water body or on Lily pads. It is met with from late June to late November (Minton 1966).

It is diurnal, shy, quite active in water, and moves about in emergent marginal vegetation in search of fish, which is its main dietary item. It also feeds on shrimps and other water creatures including tadpoles and frogs. When alarmed it slips into deep water. It has a moderate temperament and rarely bites upon handling.

It breeds from March to July; it is ovoviviparous and 20-25 eggs, average size 22 x 12 mm, are laid in early April in shallow holes in moist banks of ponds. They hatch during June and July (Malnate and Minton 1965).

*Range*:
The red-belly water snake ranges widely in the Indo-Gangetic plains, from Assam through Bangladesh, to the Indus Delta. Northward it extends up to Nepal. In Pakistan it is known only from lower Sindh (Khan 1999e).

### *34. Xenochrophis piscator piscator* (Schneider) (**Figs.10.37 and 10.21B**)

Checkered keelback: *Chittra dhoobi saamp*

1. Head slightly flattened, distinct from neck.
2. Supralabials 8-10, fourth and fifth in eye; 9-10 infralabials (Figure 28C).
3. Anterior genial tuberculated in adult male.
4. Ventrals 135-152, subcaudals 62-78. Snout-vent length 930-940 mm, tail 175-180 mm.

*Color*:
Dorsum light green-gray or light reddish brown, with 5 rows of blackish blotches, smaller than interspaces, often fused with each other to form a reticulation, more marked in anterior half of body, the pattern fades posteriorly. A pair of dark post-oculo-supralabial bars. Ventrum white or cream.

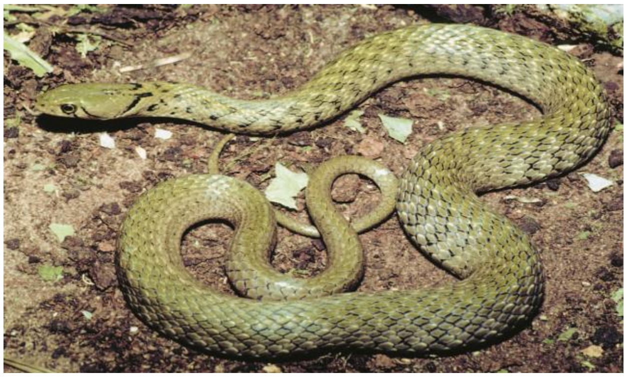


**Fig.10.37.** *Xenochrophis piscator piscator* (Schneider)

*Habitat*:
The checkered keel back is more common in large ponds with thick emergent vegetation; it confines itself mainly to side pools, avoiding the main stream. In winter when most of the water bodies are dry, the helpless snakes are killed in large numbers by people and other animals like mongoose and kites in large numbers. Water-visiting bird are said to take a high toll on young snakes. The snakes that have survived attack usually have broken tails, which are common in this species (Auffenberg 1980b).

The water snake is strong and active, moving briskly on land and in water. It is reported to move in jumps on land (Wall 1907b). It is known to be bad tempered; when cornered it rears up and flattens its body ready to bite. It strikes with great determination and rapidity. It bites viciously, holding on with such tenacity that it is difficult to dislodge. It leaves nasty wounds. During winter it is diurnal, while in summer it becomes crepuscular and nocturnal. It is often seen swimming close to the upper warmer layers of pond in winter and basks on dry ground.

It feeds on fishes, frogs, and tadpoles (Minton 1966; Auffenberg 1980b). The prey is ambushed, with the large teeth of the snake playing an important role in retaining a firm hold on slippery prey and subduing it.

The water snake breeds from February to May; 50-80 eggs are laid in adhering clusters in holes away from water. Eggs measure 27-31 x 15-18 mm in dimension.

*Range*:
This snake has wide Range in Southeast Asia, from Borneo, Taiwan, throughout India, westward to the Indus Delta. It is quite common in all major drainage systems in the upper and lower Indus Valley.

### *35. Xenochrophis sanctijohannis* Boulenger
(**Fig. 10.24B**)

1. A single (fourth) supralabial touching eye.
2. Single pre- and 3 postoculars.
3. Dorsals feebly keeled, outer 4 rows smooth.
4. Ventrals 149-159, subcaudals 85-92.
5. Postoculosupralabial stripes absent, or very feebly indicated.
   Snout-vent length 830-835 mm, tail 273-275 mm.

*Color*:
Dorsum yellowish green without pattern or slight indication of spots on anterior half of body.

*Habitat*:
This water snake was first recorded from a fast-flowing stream in Kashmir; recently it has been collected from irrigation channels from the Sutlej River, in Cholistan, southern Punjab.

*Range*:
Primarily a highland water snake, it is washed down the Sutlej River and finds its way into irrigation channels in areas surrounding Bahawalnagar and Bahawalpur, southern Punjab, Pakistan.

## Family Typhlopidae

**Key:**

1. Midbody scales 25 or more.......................... .................................. *Typhlops diardii*
   Midbody scales less than 25 ...................... 2
2. Scales around midbody 20.......................... ................... *Ramphotyphlops braminus*
   Scales around the midbody 18................... 3
3. Midbody diameter does not exceed 2 mm ........................ *Typhlops ductuliformes*
   Midbody diameter exceeds 2 mm.............. 4
4. Nasal scale completely divided ................... ..................... *Typhlops madgemintonai*
   Nasal scale incompletely divided .............. 5
5. Preocular in contact with third supralabial only................................ *Typhlops ahsanuli*
   Preocular in contact with third and fourth supralabials .... *T. madgemintonai shermanai*

### *1. Ramphotyphlops braminus* (Daudin)
**(Fig.10.38)**

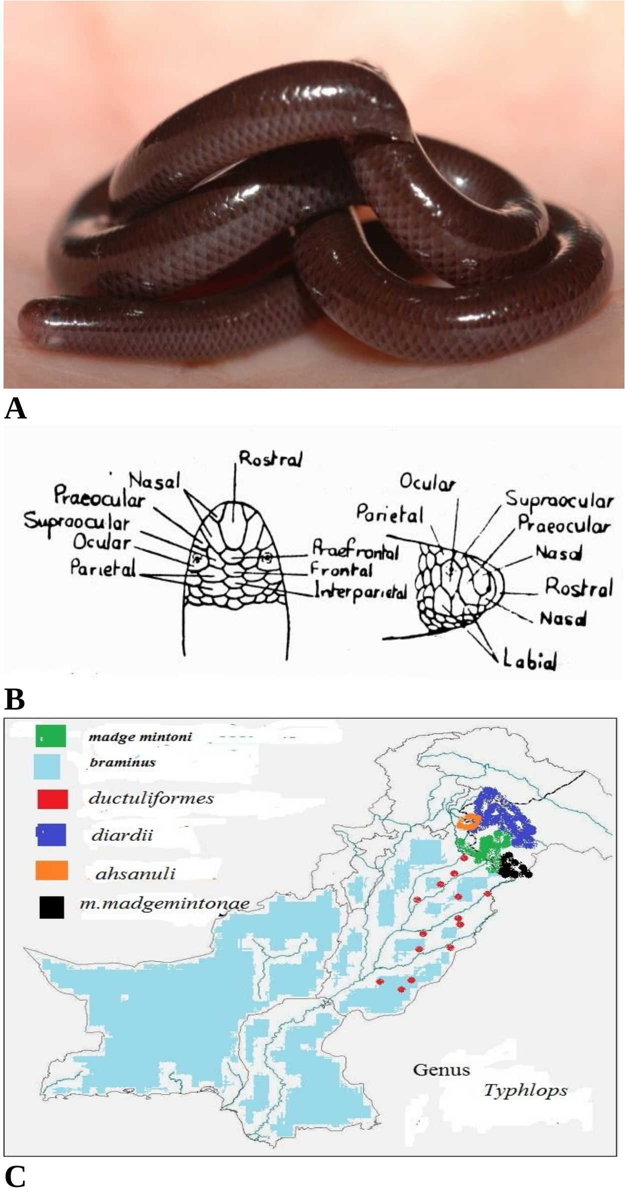


**Fig.10.38.** A, *Ramphotyphlops braminus* (Daudin); B, head scales; C shows distribution of different species of genera *Ramphotyphlops* Typhlops in different parts of Pakistan.

*Color*:
Dorsum reddish brown to dark brown, ventrum slightly pale.

*Notes*:
Frequents humid shady fields with loose soil. Small plots in humid and shady environs of gardens and tilled fields, where the soil is periodically turned to keep it loose, are ideal situations for this snake.

*Range*:
Almost cosmopolitan, attributed to the human activity, carried to remote areas in potted plants etc. In Pakistan it is quite abundant in the upper and lower Indus Valleys and except for the high mountains and deserts, it is reported from almost all over Pakistan.

### ***2. Typhlops ahsanuli*** M.S.Khan

**(Fig.10.39)**

1. The supranasal suture is 75% complete.
2. The anterior nasal scale overlaps the first supralabial and anterior ventral part of the posterior nasal scale.
3. The posterior nasal scale is deeply scalloped behind so that the preocular scale extends deep in the postnasal concavity.
4. The preocular scale is larger than the ocular.
5. The preocularnasal suture is studded with thick squamous glands.
6. Preocular scale is in contact with only third supralabial.
7. The posterior nasal scale is in contact with second and third supralabials.
8. The supralabial imbrication formula is:
   N1/SL1/N2, N2/SL2/Poc, Poc/SL3/Oc, Oc+postoc/SL4
9. Body scales have micropits on zz surface.
10. Tail with terminal spine.
    Total length 170 mm.

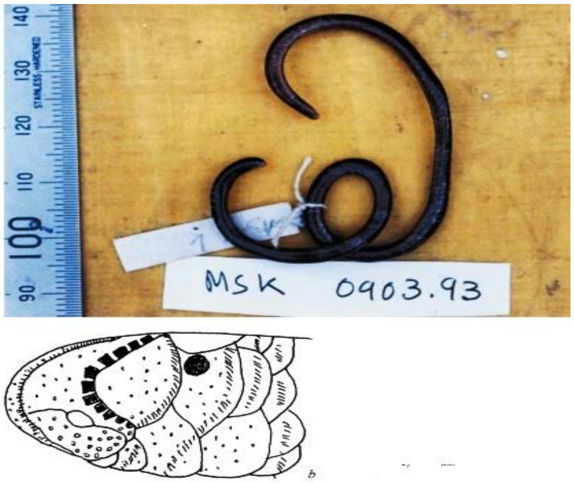


**Fig.10.39.** *Typhlops ahsanuli* M.S.Khan

*Color***:**
Dorsum dark brown, ventrum slightly lighter.

*Notes***:**
**C**ollected from an ant hole among stones, under stones ant nests; apparently the ants were not heeding its presence.

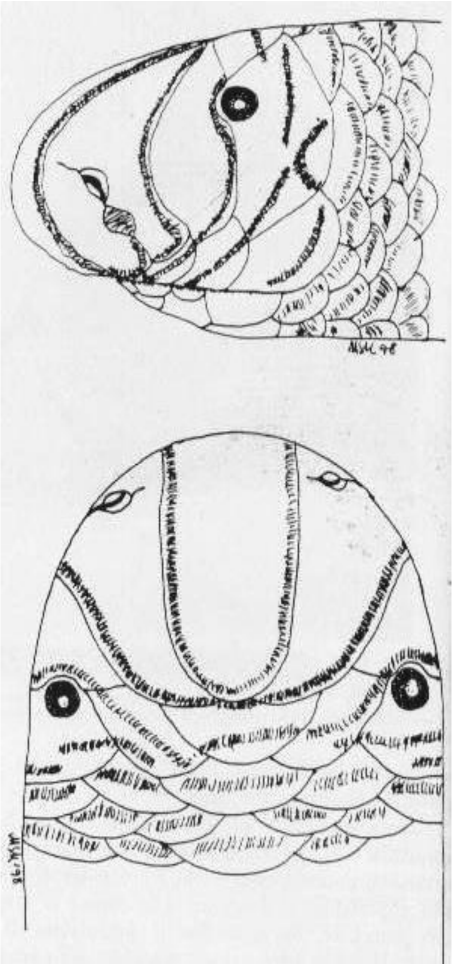
*Rage*:
Known only from its type locality, Nadari village, 2 km east of Goi Madan, District Kotli, Azad Kashmir.

### ***3. Typhlops diardii platyventris*** **Khan, M.S.**

**(Fig.10.40)**

1. Body stout.
2. Number of scales around midbody 22-25.
3. Body ventrum distinctly flat.
4. A distinct subnarial glandular patch.
5. Supralabial imbrication formula: N1/SL1, N2/SL2/PrOc, PrOc/SL3/Oc, Oc/SL4
6. Tail ends in a spine.
   Total length 214-295 mm.

*Color*:
Light to dark brown dorsum, light yellowish below.



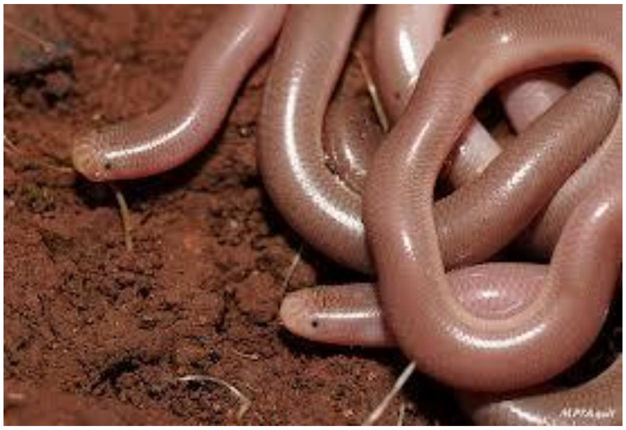


**Fig.10.40.** *Typhlops diardii platyventris* Khan, M.S.

*Habitat*:
The snake was collected from under stones along fast-flowing streams.

*Range*:
*T. diardii platyventris* is known from its type locality, Goi Madan, Kotli, Azad Kashmir.

### *4. Typhlops ductuliformes* Khan, M.S.
**(Fig.10.41)**

1. Nasal suture usually touches second labial, and does not divide nasal scale completely.
2. Eyes hardly visible.
3. Scales around midbody 18.
4. Diameter of body less than 2 mm.
5. Middorsals 412-461.
6. The supralabial imbrication formula is: N1/SL1, N2/SL2/Poc, Poc/SL3/Oc, Pto/SL4.
7. Tail ends in a spineless cone.
8. Microstriations on the surface of body scales.
   Total length 90-202 mm.

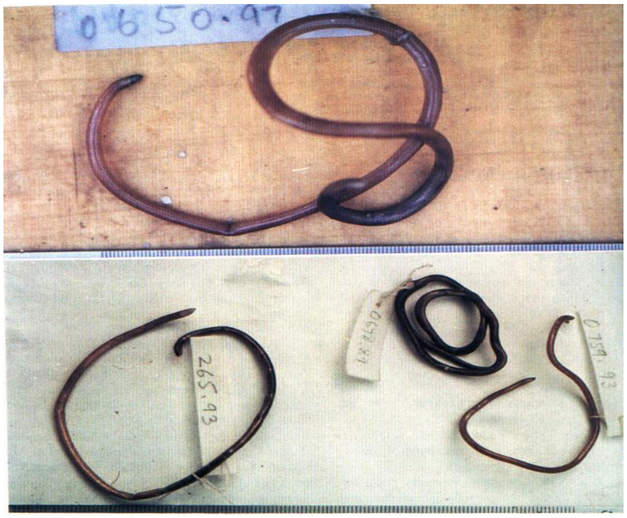


**Fig.10.41.** *Typhlops ductuliformes* Khan, M.S.

*Color*:
Body dorsum light chocolate, ventrum dirty white; exposed part of body scales dark brown, distinctly marked from light chocolate flared part of rest of the scale.

*Habitat*:
Collected along well watered grassy plots.

*Range*:

Known from Jhangir's tomb, Lahore, Hyderabad, and Karachi, Pakistan.

### 5. *Typhlops madgemintonae madgemintonae*

Khan, M. S.

**(Fig.10.42)**

1. Nasal almost completely divided.
2. 336-364.
3. Caudal spine solid cuspidate, with thick embossed base.
4. Subcaudal colorless area extends dorsally to include base of the caudal spine.
5. Posterior one-fourth of the body strongly coiled ventrally.
6. Supralabial imbrication formula: *T* N1/SL1, N2/SL2/Poc, Poc/SL3/Oc, Oc+ Postoc/SL4.
7. Micropits on the surface of the body scales.
8. Tail ends in a spine.
   Total length 170-200 mm.

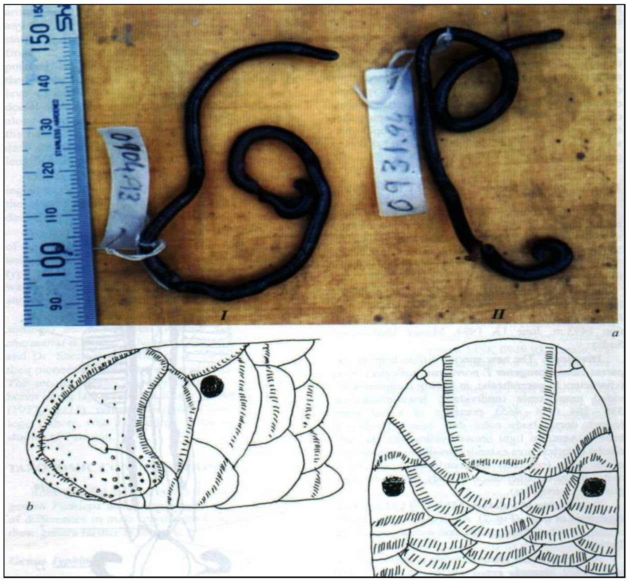


**Fig.10.43** *Typhlops madgemintonae madgemintonae* Khan, M. S.

*Color*:

Dorsum uniformly dark brown, lighter ventrum. Snout, labia, circum-anal and subcaudal regions are colorless. The subcaudal colorless area extends dorsally to include tail spine and its base.

*Habitat*:

From rocky pine country side with lush green vegetation of grasses. The collection of this snake coincides with the rainy season when rainwater floods subterranean animal life.

*Range*:

Known from Goi Madan and Barmoach, District Kotli, Azad Kashmir.

### 6. *Typhlops madgemintonae shermanai*

Khan, M. S.

**(Fig.10.44)**

1. The supranasal suture is 50% complete.
2. Narial opening round, anterolateral.
3. A subnarial pit in the inferior nasal suture.
4. Preocular and ocular scales subequal.

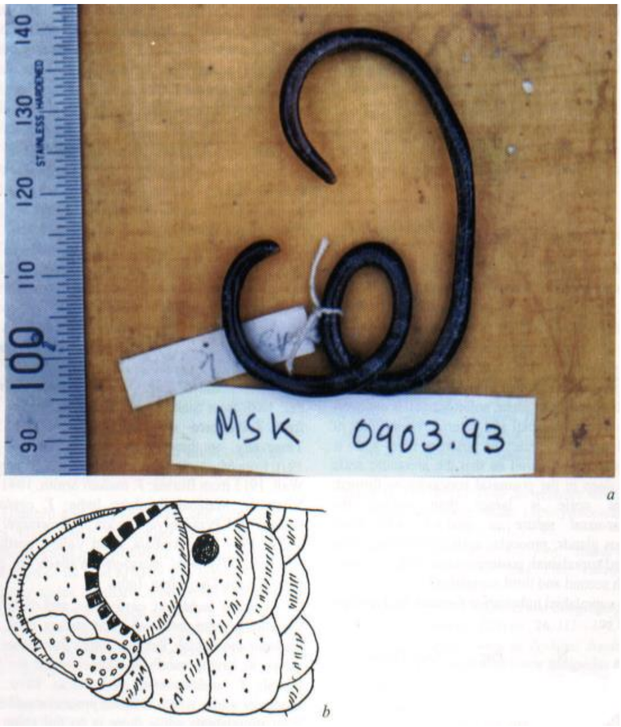


**Fig.10.44.** ***Typhlops madgemintonae shermanai*** Khan, M. S.

5. A row of thick squamous glands, along preoculonasal suture.
6. Labial imbrication formula:
   N1/SL1/N2, N2/SL2/Poc, Poc/SL3/Oc, Oc+Postoc/SL4.
7. Surface of body scales with micropits.
8. Tail ends in a spine.
   Total length 120-150 mm.

*Color*:
Dorsum dark brown, ventrum lighter. Circumanal, subcaudal, and base of spine colorless.

*Habitat*:
From under leaf litter at the roots of a pine tree on a rocky slope, near an ant nest.

*Range*:
Kashmir and Rabwah, Punjab, Pakistan. Probably washed down by flood water in the Chenab River from Kashmir.

## Family Leptotyphlopidae

**Key:**

1. Rostral large, hooked; total length of body 80-110 times its diameter ............................ ............. *Leptotyphlops macrorhynchus*
2. Rostral normal, round; total length 55-70 times its diameter.... *Leptotyphlops blanfordii*

### ***1. Leptotyphlops blanfordii*** (Boulenger)
### **(Fig.10.45)**

1. Rostral, nasal and ocular scales large, border the mouth.
2. Snout round, rostral not large, protruding not concave below.
3. Diameter of body contained 57-78 times in total length.
4. Scale rows around body 14.
   Snout-vent length 220-225 mm, tail 21 mm.

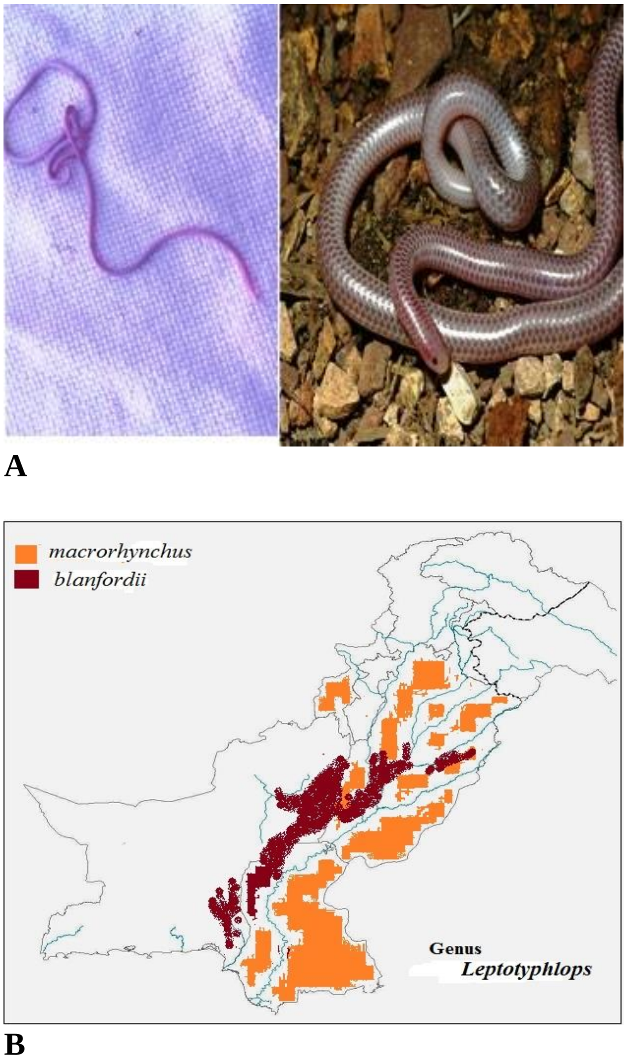


**Fig.10.45. *Leptotyphlops blanfordii*** (Boulenger). B shows distribution of L. *macrorhyncha* and L. blanfordii in different parts of Pakistan.

*Color*:
In life, pale pink to brown.

*Habitat*:
This snake inhabits loose sandy soil with considerable moisture and feeds on termites and ant larvae.

*Range*:
From throughout the riparian system of Pakistan, at low elevations, in Sindh, Pakistan.

### ***2. Leptotyphlops macrorhynchus*** (Jan) **(Fig.10.46)**

1. Rostral scale prominent, hooked downward, and is concave from below.
2. Diameter of body 80-110 times contained in the total length.
   Snout-vent length 243-245 mm, tail 21-22 mm.

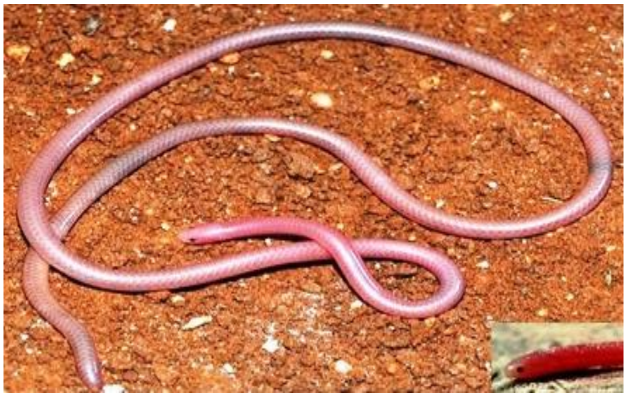


**Fig.10.46.** *Leptotyphlops macrorhynchus* (Jan)

*Color*:
Light brown to pink or flesh color.

*Habitat*:
Moist sandy areas, especially along water courses: rivers, canals, lakes, and fast-flowing streams.

*Range*:
From Sudan, Egypt, Saudi Arabia, Iraq, and Iran. In Pakistan it is recorded from Quetta to the Indus valley.

# APPENDIX

## Scientific, common English and Urdu names

| Scientific names | Common English | | Urdu |
|---|---|---|---|
| **Family Scincidae** | **Skinks** | ***Raig mahi*** | ریگ ماہی |
| *Ablepharus grayanus* (Stoliczka, 1872) | Earless Snake-eyed Skink: | *Boly saamp-chism raig mahi* | بولی ریگ ماہی |
| Family Colubridae | ***Coluber*** | ***Koluber*** | کولوبر |
| *Amphiesma platyceps* (Blyth, 1854) | Spotted Keel-back: | *Chitra Khar-pusht* | چترا خارپُشت سانپ |
| *Amphiesma sieboldii* (Günther, 1860) | Himalayan Keel-back | *Uttri Khar-pusht* | اُتری خارپُشت سانپ |
| *Amphiesma stolatum* (Linnaeus, 1758) | Striped Keel-back | *Patta dar Khar-pusht* | پٹی دار خارپُشت سانپ |
| *Argyrogena fasciolata* (Shaw, 1802) | Banded Racer | *Patta dar Taiz-rau* | پٹیدار تیزرو سانپ |
| *Boiga melanocephala* (Annandale, 1904) | Dark-head Cat Snake | *Siah sar billi-chisham Saamp* | سیاہ سر بلی چشم سانپ |
| *Boiga trigonata* (Schneider, 1802) | Brown Cat Snake | *Bhoora Billi-chisham Saamp* | بھورا بلی چشم سانپ |
| *Coluber k. karelini* Brandt, 1838 | Banded Desert Racer | *Patta-Dar koluber Saamp* | پٹیدار کولوبر سانپ |
| *Coluber k. mintonorum* Mertens, 1969 | Minton’s Cliff Racer | *Minton ka Pahari saamp* | منٹن کا پہاڑی سانپ |
| *Enhydris pakistanica* Mertens, 1959 | Sindh Ditch Snake | *Sindhi Jheel saamp* | سندھ وادی جھیل سانپ |
| *Hemorrhois ravergieri* (Ménétriés, 1832) | Mountain Racer | *Pahari Koluber* | پہاڑی کولوبر سانپ |
| *Lycodon a. aulicus* (Linnaeus, 1758) | Common Wolf Snake | *wolf-saamp* | ولف سانپ |
| *Lycodon striatus bicolor* (Nikolski, 1903) | Golden Wolf Snake | *Sunahra wolf-saamp* | سنہرا ولف سانپ |
| *Lycodon s. striatus* (Shaw, 1802) | Spotted Wolf Snake | *Chittra wolf-saamp* | چترا ولف سانپ |
| *Lycodon travancoricus* (Beddome, 1870) | Southern Wolf Snake | *Dakhni wolf-saamp* | دکھنی ولف سانپ |
| *Lytorhynchus maynardi* Alcock & Finn, 1896 | Western Awl Head Snake | *Dakhni Crotia-sar samp* | دکھنی کروشیا سر سانپ |
| *Lytorhynchus paradoxus* (Günther, 1875) | Sindh Awl Head Snake | *Sindhi crotia-sar samp* | سندھی کروشیا سر سانپ |
| *Lytorhynchus ridgewayi* Boulenger, 1887 | Afghan Awl Head Snake | *Afghan crotia-sar* | افغانی کروشیا سر سانپ |
| *Natrix tessellata* (Laurenti, 1768) | Blotched Water Snake | *Chitra dhobi-snake* | چترا دھوبی سانپ |
| *Oligodon arnensis* (Shaw, 1802) | Russet Kukri Snake | *Bhoora kukri saamp* | بھورا ککری سانپ |
| *Oligodon taeniolatus* (Jerdon, 1853) | Streaked Kukri Snake: | *Dahari-dar kukri saamp* | دھاری دار ککری سانپ |
| *Platyceps rhodorachis kashmirensis* (M.S. Khan & A.Q.Khan, 2000) | Kashmir Cliff Racer | *Kashmir koluber* | کشمیری کولوبر سانپ |
| *Platyceps rhodorachis ladacensis* (J. Anderson, 1871) | Ladakh Racer | *Ladak koluber* | لدّاخ کولوبر سانپ |
| *Platyceps rhodorachis rhodorachis* (Jan, 1865) | Cliff Racer | *Chattani koluber* | چٹانی کولوبر سانپ |
| *Platyceps ventromaculatus bengalensis* (M.S.Khan & A.Q.Khan, 2000) | Bengal Racer | *Bengali koluber* | بنگال کولوبر سانپ |

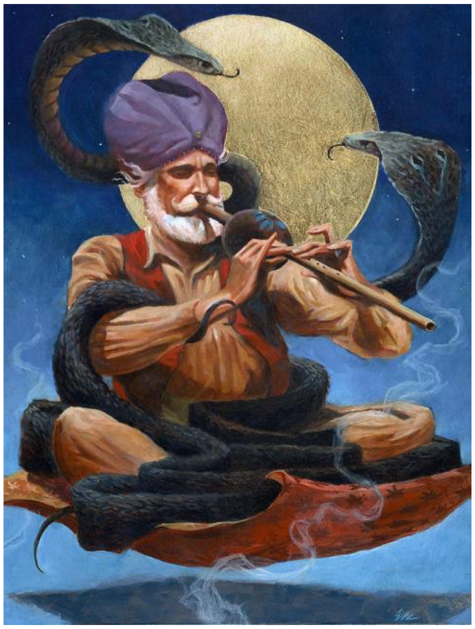
*Continued…………*

| Scientific names | Common English | | Urdu |
|---|---|---|---|
| *Platyceps ventromaculatus indusai* (M.S.Khan & A.Q.Khan, 2000) | Sindh Racer | *Sindhi koluber* | سندھ کولوبر سانپ |
| *Platyceps ventromaculatus ventromaculatus* (Gray & Hardwicke, 1834) | Indus Valley Racer: | *Maidani koluber* | میدانی کولوبر سانپ |
| *Psammophis condanarus condanarus* (Merrem, 1820) | Indo-Burmese Sand Snake | *Burma teer-mar* | برمی تیر مار |
| *Psammophis leithii leithii* Günther, 1869 | Pakistan Ribbon Snake | *Sindhi teer-mar* | سندھی تیر مار |
| *Psammophis lineolatus lineolatus* (Brandt, 1838) | Steppe Ribbon Snake | *Dhari-dar teer-mar* | پٹہ دار تیر مار |
| *Psammophis schokari schokari* (Forskål, 1775) | Saharo-Sindhian Ribbon Snake | *Saharai teer-mar* | صحرائی تیر مار |
| *Pseudocyclophis persicus* (J. Anderson, 1872) | Iran Dwarf Racer: | *Irani podna taiz-rau saamp* | ایرانی تیز رو سانپ |
| *Ptyas mucosus* (Linnaeus, 1758) | Rat Snake | *Dahaman* | دھامن سانپ |
| *Sibynophis sagittarius* (Cantor, 1839) | Golden Snake | *Sunahra saamp* | سنہرا سانپ |
| *Spalerosophis arenarius* (Boulenger, 1890) | Red-spotted Diadem Snake | *Ragistani dabba saamp* | ریگستانی ڈبہ سانپ |
| *Spalerosophis diadema diadema* (Schlegel, 1837) | Royal Snake, Diadem Snake | *Surakh dabba saamp* | سرخ ڈبہ سانپ |
| *Spalerosophis diadema atriceps* (Fisher, 1885) | Variegated Diadem Snake | *Chatkabra samp* | چتکبرہ سانپ |
| *Spalerosophis schirazianus* (Jan, 1865) | Persian Diadem Snake: | *Irani dabba saamp* | ایرانی ڈبہ سانپ |
| *Telescopus rhinopoma* (Blanford, 1874) | Desert Cat Snake | *Regasthani billi saamp* | ریگستانی بلی سانپ |
| *Xenochrophis cerasogaster cerasogaster* (Cantor, 1839) | Red-belly Marsh Snake | *Surakh dhoobi saamp* | سرخ پیٹ دھوبی سانپ |
| *Xenochrophis piscator piscator* (Schneider, 1799) | Checkered Keelback: | *Chittra dhoobi saamp* | چترا دھوبی سانپ |
| *Xenochrophis sanctijohannis* (Boulenger, 1890) | Olive Water Snake | *Zatooni dhoobi saamp* | زیتونی دھوبی سانپ |

# Chapter 11

## Venomous Snakes
## Elapidae, Viperidae, Crotalidae & Hydrophiidae

Family Elapidae ............................................ 183
Family Viperidae .......................................... 186
Family Crotalidae.......................................... 191
Family Hydrophiidae .................................... 193



Legendry snake charmer

### Family Elapidae

**Key:**

1. Vertebral row of dorsals distinctly enlarged, subcaudals undivided .................2
   Vertebral row not enlarged; subcaudals divided .......................................................3
2. Scales at midbody 15. ..*Bungarus caeruleus*
   Scales at midbody 17 ....*Bungarus sindanus*
3. Dorsum jet black to light black; usually a cuneate scale present...................*Naja naja*
   Dorsum yellow brown or variegated; the cuneate scale usually absent........ *Naja oxiana*

### *1. Bungarus caeruleus caeruleus* (Schneider) (**Fig.11.1**)

1. Medium sized snakes, head barely distinguishable from neck.
2. Small eyes, round pupil, barely visible in life.
3. Loreal absent, one pre, two postoculars.
4. Temporals 1+2.
5. Supralabials 7, third and fourth in eye; 8 infralabials.
6. Body scales smooth, shiny, in 15 rows at midbody.
7. First transverse light stripe appears between forty-second and forty-third ventral.

8. Ventral 205-217, subcaudals 43-54, undivided.
   Snout-vent length 1120-1125 mm, tail 150-157 mm.

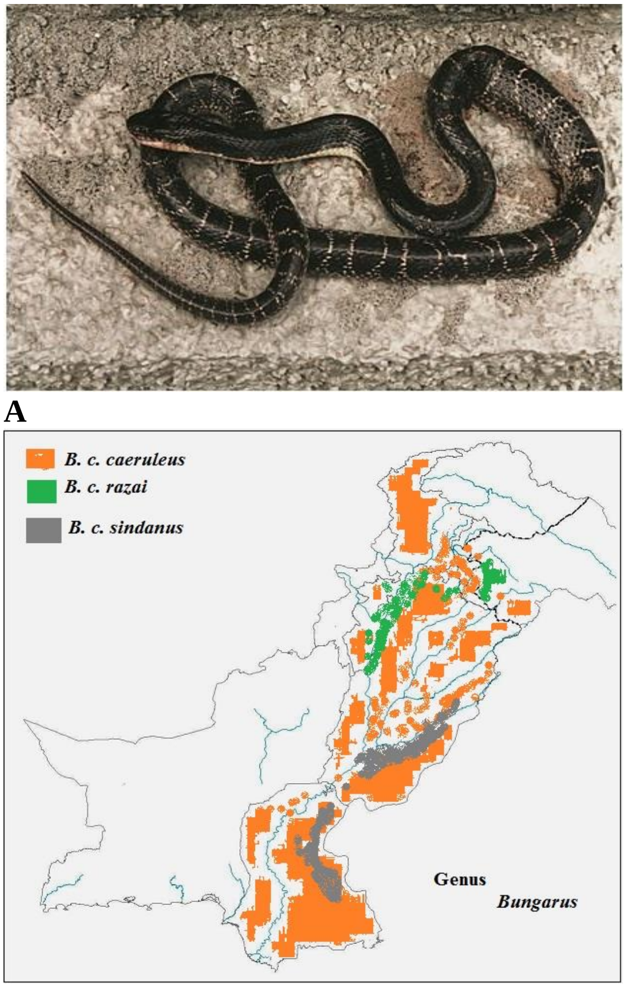


**Fig.11.1.** *Bungarus caeruleus caeruleus* (Schneider). B shows distribution of species of Genus *Bungarus* in different parts of Pakistan.

*Colour*:
Dorsum jet black to deep blue, which upon preservation becomes dark brown. A series of 3-9 light vertebral spots on anterior part of body followed by 38-56 narrow transverse bands, usually in pairs. Supralabials and body ventrum white.

*Habitat*:
Frequents open grasslands, semi-deserts with alluvial soil; marginal vegetation along agricultural land, barns, farms, groves and gardens. Extend in residential areas.

*Range*:
Reported from Bangladesh, throughout India, and northern Sri Lanka, throughout Pakistan.

### *2. Bungarus sindanus sindanus* Boulenger
**(Fig.11.2 & 11.1B)**

1. Midbody scale rows 17.
2. Ventrals range from 220-237, subcaudals 49-52.
3. First light transverse band appears at the level of eleventh to fifteenth ventrals.
   Snout-vent length 1034-1038 mm, tail 132-137 mm.

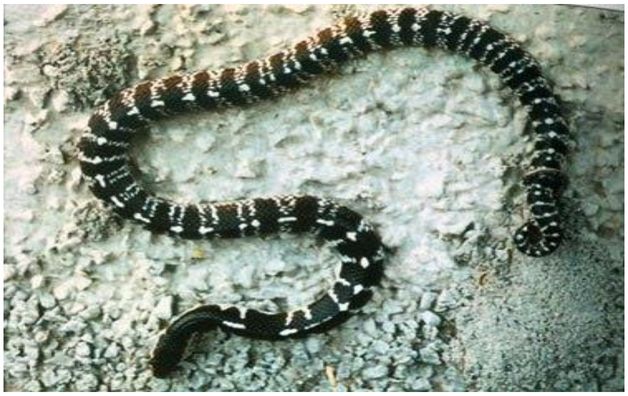


**Fig.11.2.** *Bungarus sindanus sindanus* Boulenger.

*Colour*:
Dorsum with similar color and pattern as in preceding species, except that first light stripe appears at the level of eleventh to fifteenth ventral.

*Habitat*:
Deserticolous situations. In the Thar, Cholistan, and Thal Deserts fine sandy alluvium with sparse vegetation.

*Range:*
Reported from Umar Kot and Khanpur in Sindh, Bahawalpur, Bahawalnagar, Rhimyar Khan in Punjab, Pakistan.

### *3. Bungarus sindanus razai* M. S. Khan
(**Fig.11.3 & 11.1B**)

1. Midbody scales 17.
2. Ventrals 214-221.
3. Subcaudals 44-47.

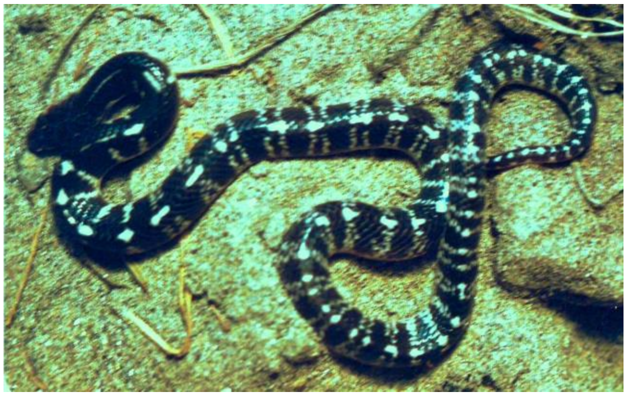


**Fig.11.3.** *Bungarus sindanus razai* M.S. Khan.

*Range***.**
Northwestern highland, reported from Azad Kashmir.

### *4. Naja n. naja* (Linnaeus)
(**Fig.11.4**)

1. Medium sized, heavy snake.
2. Head not distinct from body, neck dilatable into an expanded hood.
3. Loreal absent.
4. No maxillary teeth (very rarely 1).
5. Body scales smooth, in 21-23 at midbody.
6. Ventrals 182-196, subcaudals 53-67. Snout-vent length 1658-1670 mm; tail 269-272 mm.

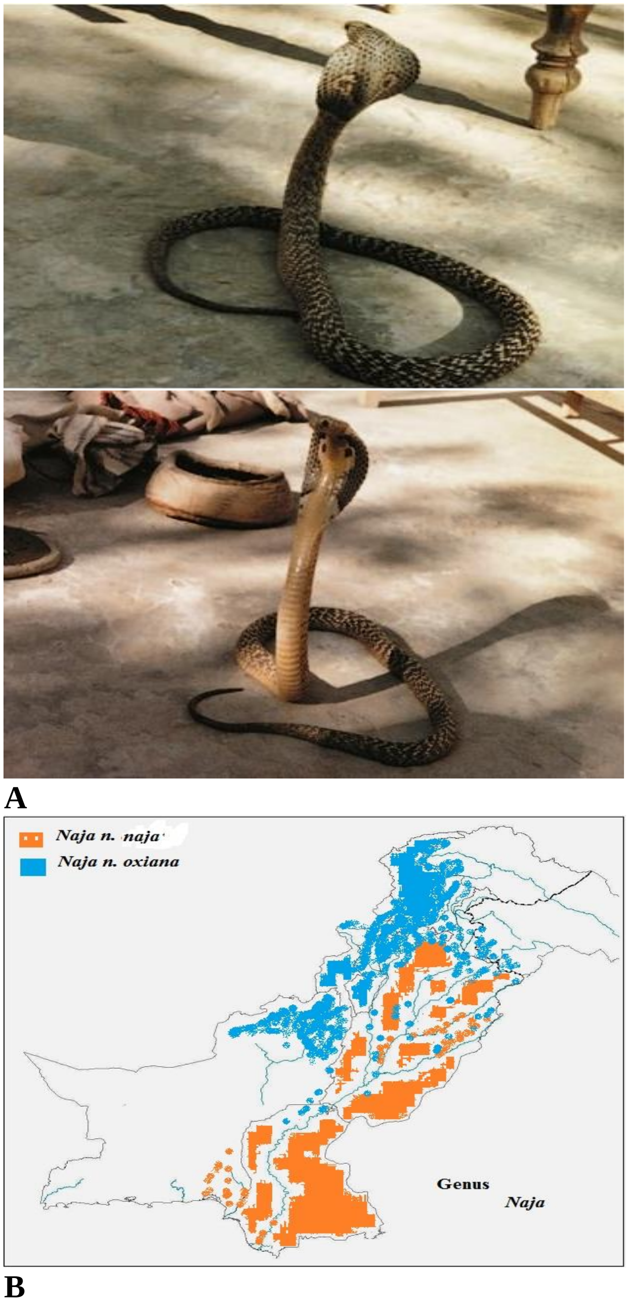


**Fig.11.4.** *Naja n. naja* (Linnaeus). B shows distribution of *Naja n. naja* in different parts of Pakistan.

*Colour*:
Adult jet black, dark olive or dark brown, or, variegated. Ventrum pale gray to yellowish with heavy slate gray or dark brown clouding. A spectacle mark on hood dorsum and a large round dark ocellus ringed with yellow on hood

ventrum, medially interrupted by dark sub-hood ventrals. Usually, variegated specimens with light-edged brown scales are met with in Punjab, while jet black snakes are rare. Juveniles with dark cross bands.

*Habitat*:
Frequents grassland, vegetation along tilled fields, water courses, semidesert forests, barns, ruins with grassy growths, and growths around villages. Plentiful in paddy growing area, where it is attracted by mice and poultry into inhabited houses.

*Range*:
Reported from Bangladesh, throughout India and Sri Lanka. In Pakistan it extends along the eastern border of the Indus from Khyber Pakhtunkhwa, Punjab, and Sindh.

### ***5. Naja n. oxiana*** (Eichwald)
### (**Fig.11.5 & 11.4B**)

Both species of genus *Naja* are morphologically very close to each other. Resting on a careful study of the variables, *N. oxiana* is diagnosed as follows:

1. Ventrals 191-210, subcaudals 62-71.
2. One enlarged maxillary tooth.
3. Juvenile pattern conspicuously banded, bands extend on ventrum of body.
   Snout-vent length 1512-1520 mm, tail 236-240 mm.

*Colour*:
Light yellowish to light brown, with or without a hood mark. Two or three dark ventrals under hood. Ventrum clouded with dark.

*Habitat*:
Inhabits dry wasteland, lives in holes and crevices in uneven ground. In mountainous areas it lives in caverns, crevices, and holes in rocks

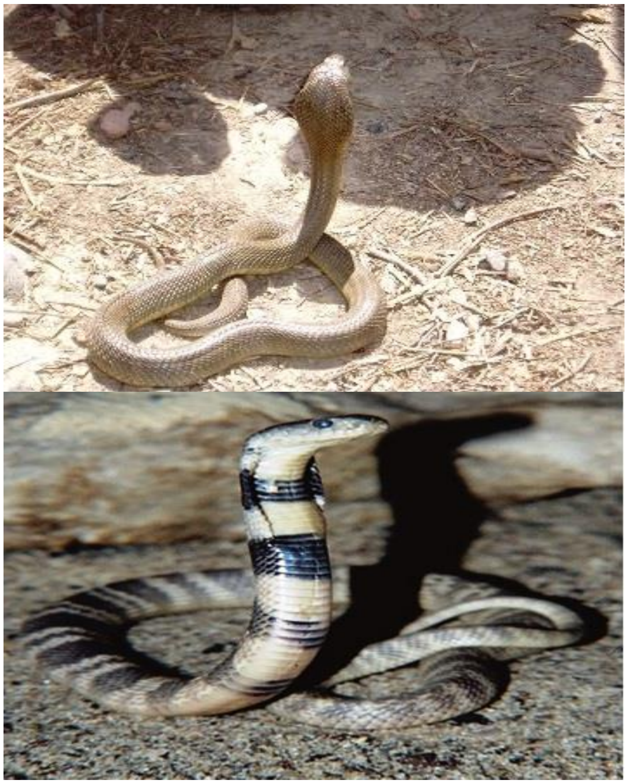


**Fig.11.5.** *Naja n. oxiana* (Eichwald).

*Range*:
From Trans caspia and southern Turkmenistan, eastern Iran, and Afghanistan. In Pakistan it is reported from throughout Khyber Pakhtunkhwa, northeastern Balochistan to northwestern Punjab and Kashmir.

## Family Viperidae

**Key:**
1. Snout flanked with enlarged butterfly-like scales jutting laterally out
   .......................*Eristicophis macmahonii*
   Snout flanked with small scales
2. Laterals small, strongly oblique, with serrated keels ......................*Echis carinatus*
   Laterals with entire keels ...........................3
3. A group of elevated supraoculars forming "horn"; keels ending in knobs ......................
   ....................... *Pseudocerastes persicus*

No supraorbital horn; keels normal .......... 4

4. Pattern of indistinct blotches on body; midbody scale rows 23-27 .......................... .......................... *Macrovipera lebetina*

Pattern of 3 rows of vivid dark brown ocelli; ocelli of middorsum, often fused to form a chain; 27-33 scale rows at midbody ..................................... *Daboia russelii*

### 1. *Daboia russelii* (Shaw and Nodder)

**(Fig.11.6)**

1. Head longer than broad, distinct from neck, body stout, dorsoventrally flattened.
2. Nostril large, crescentic in shape, in a large nasal scale.
3. Supraocular scale undivided.
4. Supralabials 11 to 12, separated from eye by 3-4 rows of small scales; 13-15 infralabials.
5. Anterior genial short and wide, posterior not differentiated.
6. Dorsals strongly keeled in 27-33 rows at midbody.
7. Ventrals 164-178, subcaudals 46-58, anal not divided.

   Snout-vent length 1080-1090 mm, tail 220-225 mm.

*Colour*:

Dorsum light yellowish brown to sandy, with a median series of 22-32, large oblong chestnut blotches, bordered with black or dark brown, narrowly edged with cream, arranged lengthwise, mostly confluent with each other to form a middorsal chain. A lateral series of similar but smaller spots which on lower side are with scattered dark flecks with lighter edges. A pair of dark spots at base of head.

*Habitat*:

Inhabits mesic habitat of grass fields with marginal trees, salty scrubby areas, along marginal growths of water bodies, hedges and fences along gardens and gallery forests.

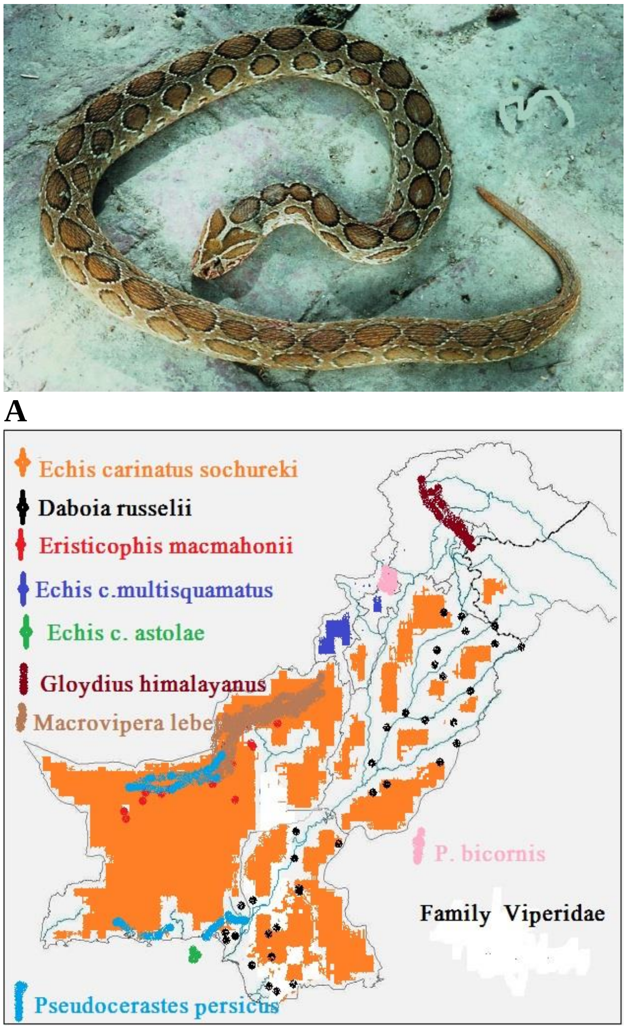


**Fig.11.6.** *Daboia russelii* (Shaw and Nodder). B shows distribution of various species of family *Viperidae* in different parts of Pakistan.

*Range*:

Recorded from throughout the Indus Valley, from Karachi to Rawalpindi, at low altitudes. It is reported from throughout India to Bangladesh, extends into peninsular India and Sri Lanka. Distinguished in several races throughout Southeast Asia to Taiwan.

### 2. *Echis carinatus* (Schneider)

**(Fig.11.7 & 11.6B)**

1. Head short, distinctly wider than neck,

covered with small strongly keeled imbricate scales, 8-12 between supraoculars.
2. Nostrils small, dorsolateral.
3. Supralabials 8-12, separated from ocular by 1 or 2 rows of small scales; 10-13 infralabials.
4. Anterior genial broad, followed by 3 pairs of slightly enlarged scales.
5. Dorsals at midbody in 24-37 rows, strongly keeled, median dorsals large, arranged in straight lines, while 3-7 rows of laterals smaller, oblique, pointing downward, with serrated keels.
6. Ventrals 132-188, subcaudals 23-39, entire; anal single.
7. Body stocky, tail very short and abruptly tapering from vent.
   Snout-vent length 600-625 mm, tail length 51-56 mm.

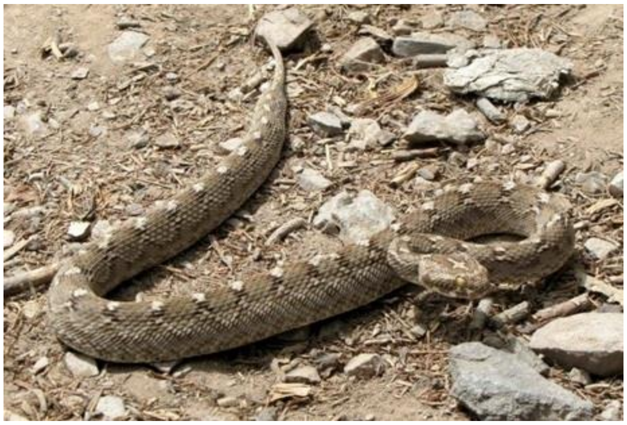


**Fig.11.7.** *Echis carinatus* (Schneider).

*Colour*:
Dorsum light brown to yellowish brown, sometimes olive brown. A median row of 28-37 dark-edged, whitish blotches. Flank with undulating white line, dorsal loops of which are more prominent, but are diluted ventrally. Head with light arrowhead mark, posterior three prongs of which extend to considerable distance. A pale stripe from eye to angle of mouth. Labials light, dotted. Ventrum white to light pinkish, with fine dark gray spots.

*Habitat*:
Recorded from sandy and rocky alluvial habitat, with sparse xerophytic to moderately dense grass and scrub vegetation. In mountainous habitat it lives under rock blocks, while in submountainous regions it inhabits hedges and other scrubby vegetation, noticeably avoiding marshy areas and very dense vegetation.

*Range*:
Widely distributed from northern Africa, through the Middle East, southern former Russia, descending to Iran, Afghanistan, most of Pakistan excluding the high northern mountains, India, and Sri Lanka.

**Races:**

### *1. Echis carinatus astolae* Mertens
(**Fig.11.6B**)

Dark blotched saw-scale viper: *Astola khappra saamp*

1. Dorsum whitish.
2. Dorsal pattern of dark brown blotches, with 1-3 lateral longitudinal rows of dark brown spots.
3. No lateral light arcs.
4. Head with 3 pronged light mark directed towards snout.
5. A light stripe from temporals, on each side, meeting each other at frontal region giving a branch to snout.

*Range*:
This race has been described from Astola Island, 25 km southeast off the Pasni coast, Balochistan, Pakistan.

### *2. Echis carinatus multisquamatus*
Cherlin (Plate 164)
(**Fig.11.8 & 11.6B**)

Waziristan saw-scale viper: *Waziristan khappra* *saamp* 1981 *Echis carinatus multisquamatus* Cherlin, Proc. Zool. Inst. Acad. Sci. 101:92-95. Type locality: Bayram-Ali, Marysk area, Turkmenia.

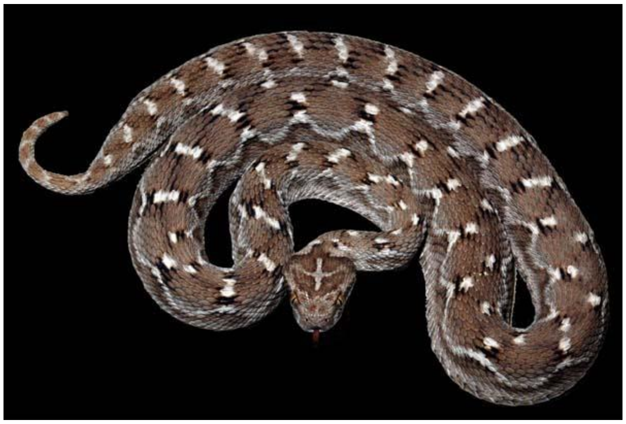


**Fig.11.8.** *Echis carinatus multisquamatus* Cherlin (Plate 164).

*Diagnosis:*
1. Head mark is always cross-shaped.
2. Lateral continuous undulating white line present.
3. Narrow transverse white bands on middorsum.
4. Midbody scale counts 34-40 (highest of all subspecies).
5. Number of ventrals 169-199 (highest of all subspecies).

*Range*:
From the Caspian Sea, through Turkmenistan, into Bukhara, Samarkand and Tashkent to Tajikistan along the Afghan border, up to Hindu Kush, northeastern Balochistan and eastern Iran.

### 3. *Echis carinatus sochureki* Stemmler
(**Fig.11.9 & 11.6B**)

Sindh Valley saw-scale viper: *Sindhi khappra saamp*

It is the widely distributed race of saw-scale viper in Pakistan, distinguished from the rest of the races by the following characteristics:

1. Head scales small, except 3-4 larger supraoculars.
2. Midbody scale rows 29-33.
3. Middorsals flat.
4. Oviparous.

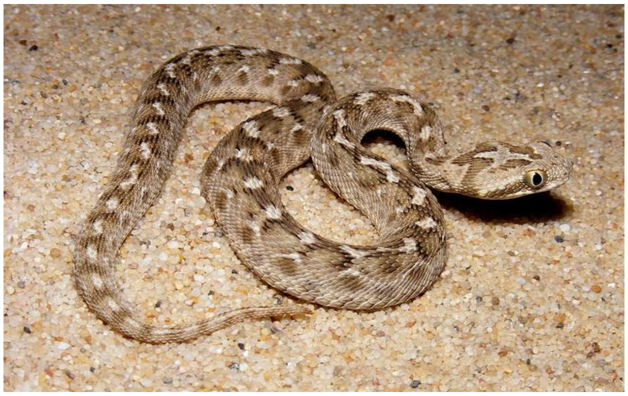


**Fig.11.9.** *Echis carinatus sochureki* Stemmler.

*Colour*:

Dorsum tan, grayish, or brown, with a median row of 30 whitish (never yellowish) blotches with dark brown edges. Body sides with wide V-shaped ventrally open marks and with distinct dark spots. Ventrum whitish with dark gray spots. Head with light arrowhead, directed toward snout. A light loreal stripe extending to angle of mouth.

*Range*:
It ranges to northern India, the whole of Pakistan except high mountains in north, southern Afghanistan, central Iran to the Iranian Gulf coast and Khuzestan.

### 3. *Eristicophis macmahonii* Alcock & Finn
(Leaf-nose viper: *Titli afi)*
(**Fig.11.10 & 11.6B**)

1. Rostral much broader than high, crescentic and deeply concave, surmounted on each

side by a wing-like, free edged, broad "butterfly" scale.
2. Small circumocular scales 16-25.
3. Supralabials 15-16, forming serrated dorsal lip, separated from eye by 3 rows of scales, about twice as large as those of the ocular ring.
4. Scales at midbody 23-29, arranged in straight regular rings.
5. Ventrals 140-145, ventrals with a keel on each side; anal undivided.
   Snout-vent length 655-660 mm, tail length 72-78 mm.

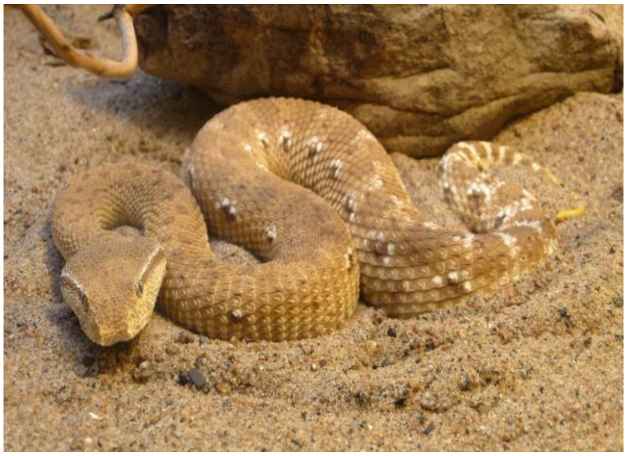


**Fig.11.10.** *Eristicophis macmahonii* Alcock & Finn (Leaf-nose viper: *Titli afi).*

*Colour*:
Dorsum light reddish brown to khaki, with a series of small dark brown lateral spots, each surrounded in its upper half by light dots. A thin light stripe from eye to angle of mouth. Base of tail with brown crossbars. Ventrum white.

*Habitat*:
This snake is morphologically adapted to live in the fine loose sand of shifting dunes. Its habitat is without any mentionable vegetation, except for very sparse growth of stunted bushes and grasses.

*Range***:**
Recorded from Seistan in the extreme east of Iran into Afghanistan south of the Helmand River and southwestern Balochistan, between the Chagai Hills and the Siahn Range, east to Nushki.

### *4. Pseudocerastes bicornis* Wall

*General characters*:
All what we have now as type specimen of this viper preserved in British Museum of Natural History London, under registry number 1946.1.20.82, a viperid head with 2-3 head lengths of anterior part of body, up to 31 ventral, rest of the body apparently is lost. The two elongated free supraocular scales of P. bicornis, were erected in life as a pair of supraocular horns on each side.

*Range***.**
Reported from Khajuri Kach, above Gwaleri kolal, Gomal Pass, Waziristan, Pakistan.

### *5. Pseudocerastes persicus*
(Duméril, Bibron & Duméril)
(**Fig.11.11 & 11.6B**)

1. A supraorbital horn on each side formed by several scales.
2. Body moderately stout, dorsoventrally flattened.
3. Circumocular scales 16 to 18.
3. Supralabials 12 to 14, separated from eye by 3 rows of small scales; 14-17 infralabials.
3. Anterior genial large, posterior not differentiated from surrounding scales.
4. Dorsals thin, weakly keeled, 23-25 rows at midbody, laterals with a nodular prominence at posterior end.
5. Ventrals without lateral keels, 146-151, subcaudals 42-46.
   Snout-vent length 688-690 mm, tail 80-85 mm.

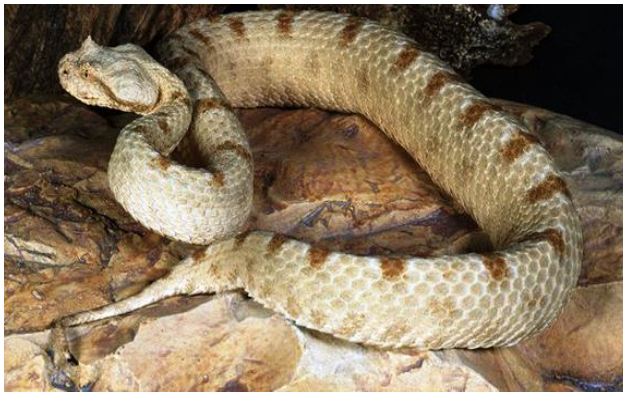


**Fig.11.11.** *Pseudocerastes persicus* (Duméril, Bibron & Duméril).

*Colour*:
Dorsum pale gray or bluish gray to khaki. A median series of 28-33 rectangular gray or brownish blotches or cross bands, much narrower than interspaces. An alternating series of faint spots on sides. A dark band from nostril to the angle of jaw, lower edges of labials white. Belly white; in larger snakes the tip of tail dark, medially pinkish.

*Habitat*:
Inhabits sandy and rocky terrain with moderate vegetation of bushes and grasses. It is nocturnal in habits, retreats during the day into crevices among rocks or burrows in comparatively hard soil near roots of bushes. Its dietary consists of deserticolous lizards, mice, and arthropods. It breeds from March to July.

*Range*:
Collected up to 2200 m of elevation. It has been recorded from Azerbaijan and northern Iraq through Iran south to Persian Gulf, eastward to central Afghanistan and western Las Bela.

### *6. Macrovipera lebetina* (Dwigubsky)
(**Fig.11.12 & 11.6B**)

1. Head short and wide.
2. Supraoculars usually divided.
3. Supralabials 10 to 11, separated from eye by 2 to 3 rows of small scales, 12-14 infralabials.
4. Dorsals keeled, in 23-25 rows at midbody.
5. Ventrals 168-176, subcaudals 42-49.
   Snout-vent length 1040-1045 mm, tail length 143-148 mm.

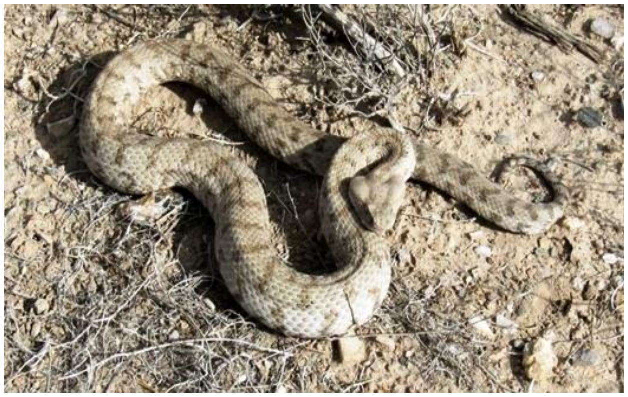


**Fig.11.12.** *Macrovipera lebetina* (Dwigubsky).

*Colour*:
Dorsum khaki to yellow brown, with minute spots. A median row of 39-42 indistinct dark gray crossbars. Ventrum buff, anteriorly whiter, clouded with gray. Tail pinkish brown.

*Habitat*:
This snake inhabits stony semiarid country with sparse scrubby vegetation, between 1000 and 2500 m of elevation.

*Range*:
Its Range extends from Caucasus to Lebanon, through southern Turkmenistan and Uzbekistan. In Pakistan its records are from the Waziristan Hills, Quetta highlands, and Chitral.

## Family Crotalidae

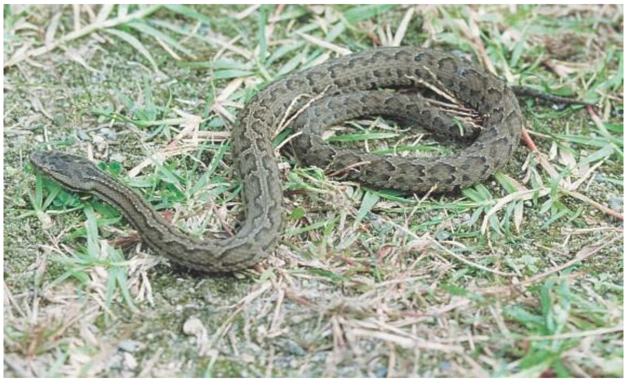
Head long, depressed, with large symmetrically arranged scales, sometimes snout scale broken in small scales; naris lateral; eye with vertically

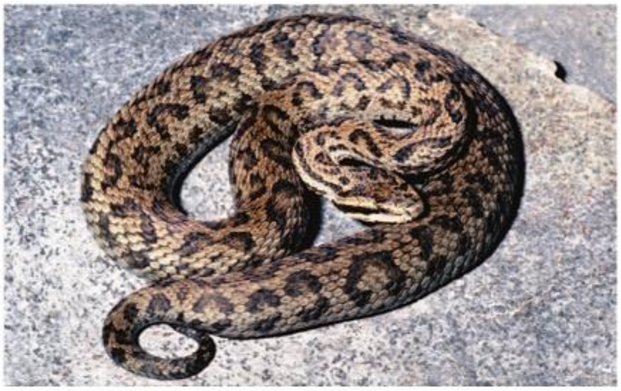
elliptical pupil; a loreal pit between eye and nostril; subcaudals divided, anal scale entire.
A single genus represented in alpine Pakistan.

### **Genus *Gloydius*** Hoge and Romano-Hoge, 1981

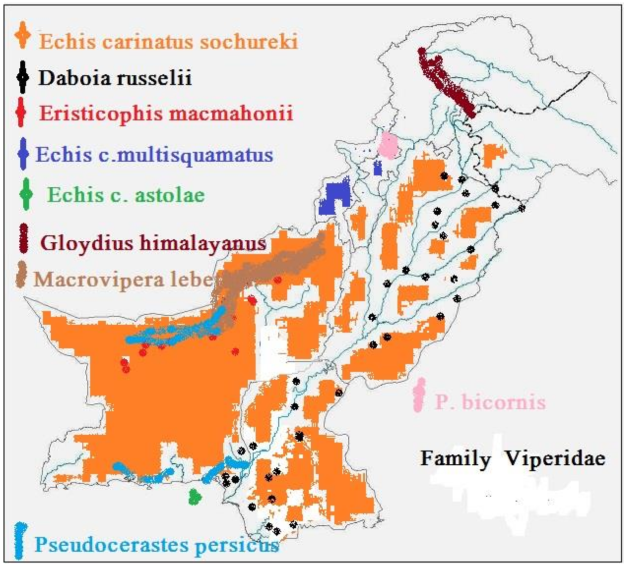
Head with large symmetrically arranged shields; a "pit" between eye and nostril; eye separated from supralabials; body scales strongly keeled.
A **s**ingle species known from alpine Pakistan.

### ***Gloydius himalayanus*** (Günther)
(Himalayan pit-viper: *Hamaliai hafra afi)*
(**Fig.11.13**)

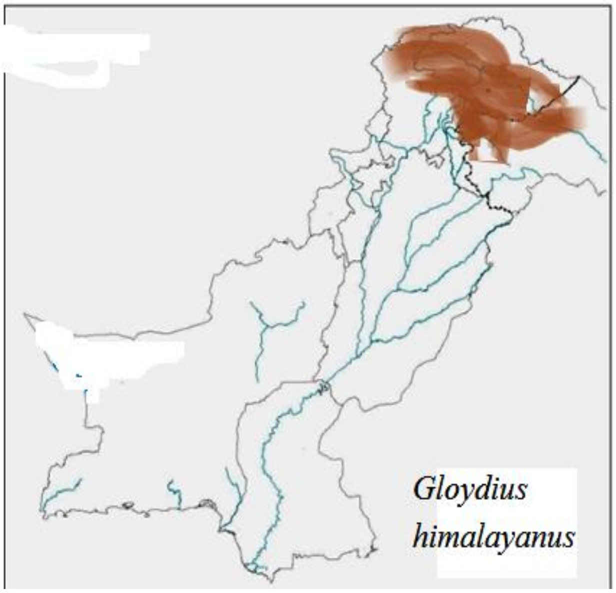

**A**


**B**

*Type locality*:
Garhval, western Himalayas, India.



**C**



**D**

**Fig.11.13.** A,B *Gloydius himalayanus* (Günther) (Himalayan pit-viper: *Hamaliai hafra afi).* C,D shows distribution of *Gloydius himalayanus* (Günther) in different parts of Pakistan.

*Diagnosis:*
1. Distinct head with large symmetrical scales.
2. A distinct pit between eye and nostril.

3. A pair of pre- and postoculars, lower postocular long, separating supralabials from eye.
4. Supralabials 7, posterior 2 united with temporals to form large post-temporal scales; 9-10 infralabials.
5. Only a single short broad genial.
6. Body scales strongly keeled, 21 rows at midbody.
7. Ventrals 147-175, subcaudals 32-52 divided.
   Snout-vent length 565-570 mm, tail 98 mm.

*Natural history notes*:
This mountain snake is restricted to an elevation of 1500 m; however, it has been reported from Dharmsala Glacier at 5000 m of elevation, the highest altitude for a snake (Wall 1910; for discussion see Gloyd and Conant 1990). It frequents rocky wooded hillsides where it lives in caverns and crevices in rocks. It takes refuge under leaf litter and fallen timber. It may be found in open fields, orchards, and hiding under marginal grass. It hibernates from October to April. Though nocturnal, it is known to bask on bright sunny days on hilly slopes. It usually selects a spot within easy reach of cover, to which it withdraws in a leisurely manner when disturbed since it is a sluggish slow-moving snake. When provoked the snake flattens its body; sometimes it coils up and vibrate its tail tip (Khan and Tasnim 1986).
It feeds mainly on skinks, other lizards, mice, millipedes, and centipedes. Adults often accumulate much fat, during summer body organs are packed with fat. Viviparous, it gives birth to 5-7 young from August to September (Khan and Tasnim 1986b).
Bite by *Gloydius himalayanus* results in local intense pain and swelling subsiding within 2-3 days, having no dangerous effect, and needing no real treatment (Acton 1921). In Kashmir local people do not fear this snake; rather they revere it (Dattatri 1985).

*Distribution*:
The Himalayan pit-viper is recorded from Nathia Gali in the western Himalayas and eastern Khyber Pakhtunkhwa, Pakistan (Khan and Tasnim 1986). The author has seen a specimen in the Government College Natural History Museum, Lahore, Pakistan, from the Dosai Plains, Baltistan, northeastern Pakistan. The viper is known to be very common in the western Himalayas, less so beyond Nepal (Wall 1910). However, its range extends from Sikkim to Chitral in the north, extending into eastern Khyber Pakhtunkhwa, Pakistan.

*Colour*:
Dorsum light brown-gray to dark brown. A median series of dark brown blotches, alternating with lateral row of spots. A broad dark band from eye to angle of mouth. Supralabials light with dark mottling. Ventrum light gray with dark clouding and fine spotting.

*Habitat*:
Mountain snake, is restricted to an elevation of 1500 m; however, it has been reported from Dharmsala Glacier at 5000 m of elevation, the highest altitude for a snake.

## Family Hydrophiidae
## Sea snakes

All marine snakes are venomous
In sea the snakes are curious and are attracted to any moving object. They may approach a diver or swimmer; however, are shy usually keep their distance. If you encounter one, keep calm and move away slowly.
Don’t touch! Mostly bites happen when fishermen touch the snakes in their catch in nets, be careful when handling nets, especially at night.

If you get hurt. Treatment is the same as for ordinary snake bites:

1. Call for immediate medical help. Antivenin is the only cure.
2. Apply a mild pressure at site, immobilize by loosely wrapping bandage.
3. Reassure the victim and help keep him/her still and calm.

Sea snakes do not leave water, and rarely extend in inland waters (rivers, lakes), so are of least concern in Pakistan, except along costal sea waters.

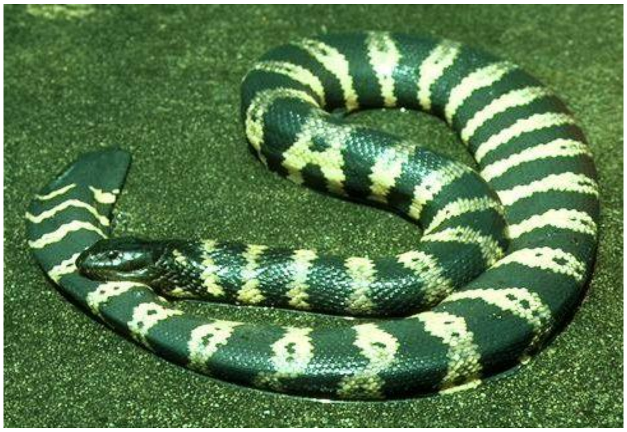
**Key:**

1. Ventrals distinct throughout, normally undivided ................................................2
   Ventrals, except anterior, either divided by a median longitudinal fissure or indistinct.......3
2. Mental scale elongate, partially hidden in a groove between first infralabial; ventrals uniform in size ............ *Enhydrina schistosa*
   Mental scale normal..................................5
3. Head very small; neck long, slender; body thick; ventrals divided by a longitudinal fissure........................................................4
   Head and body not as above ....................12
4. Prefrontal touches third supralabial; ventrals 404-468 .......................................... ..................*Microcephalophis cantoris*
   Prefrontal not touching third supralabial; ventrals 320-350 ...*Microcephalophis gracilis*
5. Ventrals broad anteriorly, narrower posteriorly...................*Praescutata viperine*
   Ventrals uniform in size............................6
6. Adult with very small head and long, slender neck ...............................................7
   Adult with large head; neck not distinct from body .................................................8
7. Ventrals 390 or more .................... *fasciatus*
   Ventrals less than 390................................. ...........................*Hydrophis mamillaris*
8. Scales on thickest part of body with round or blunt tips; imbricate; adult length more than one meter............................................9
   Scales on thickest part of body hexagonal or quadrangular; imbricate or juxtaposed; length rarely exceeds 1 meter...................10
9. Anterior temporal normally one.................. ................................*Hydrophis spiralis*
   Anterior temporals normally two ........................*Hydrophis cyanocinctus*
10. Adult with bluish gray bands on body; maxillary teeth more than 13........................ ........................*Hydrophis caerulescens*
    Adult with dark gray or greenish bands on body; maxillary teeth less than 13............11
11. Head top with curved yellow mark; ventrals 314-322.......*Hydrophis lapemoides*
    Head top mark absent; ventrals 209-312...... ................................*Hydrophis ornatus*
12. Dorsals juxtaposed ..................................13
    Dorsals pointed, strongly imbricate; ventrals indistinct ...............*Astrotia stokesii*
13. Ventrals distinct anteriorly, indistinct posteriorly ...........................*Lapemis curtus*
    Ventrals with a longitudinal fissure; dorsals subquadrangular ............... *Pelamis platurus*

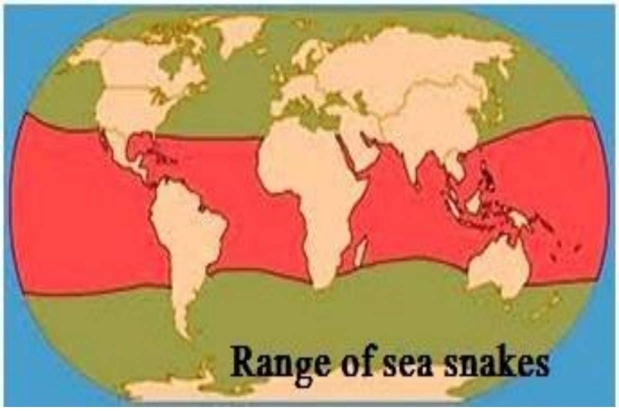
### *1. Astrotia stokesii* (Gray)

(**Fig.11.14**)

1. Head large, body short, stout with entire and regular sales.
2. Single preocular, 2 post oculars.
3. Nostril dorsal, nasal scales in contact with each other.
4. Supralabials 8-10, second sometimes third, in contact with prefrontal, fourth to sixth touching eye; 10-12 infralabials,
5. No distinct genials; body scales strongly imbricate, pointed, keeled, keels often broken in tubercles, 37-47 scale rows on neck, 47-59 on body.
6. Ventrals completely divided, except anterior-most, differentiated from rest of body scales with serrated margins; preanal strongly enlarged.
   Snout-vent length 1028-1050 mm, tail 159-180 mm.



**A**



**B**

**Fig.11.14.** *Astrotia stokesii* (Gray). B shows range of sea snakes.

*Colour*:
Dorsum yellowish or pale brown, with 32-37 more or less complete broad dark brown rings, or the dorsal pattern may be of bars and ventrum with spots. Head dark olive or yellowish.

*Habitat*:
Recorded from depth of 25-45m. It is very aggressive in water attacks repeatedly when captured.

*Range*: From the Far East, Australia, Malay Peninsula, Bay of Patani, Singapore, Sri Lanka, along peninsular India, and extending along the Makran Coast in Pakistan.

### *2. Enhydrina schistosa* (Daudin)
(**Fig.11.15**)

1. Head of moderate size, slightly distinct from slender and much elongated neck, skin of which is loose, body moderately stout and laterally compressed.
2. Head scales densely tuberculated, rostral produced downward in a beak.
3. One anterior temporal and one postocular; 7-8 supralabials, third or fourth, fourth or fifth touching eye, 9 or 10 infralabials.
4. Genials not well differentiated.
5. Scales at midbody 51-65, subimbricate, with short central keel.
6. Ventrals small, 300-365; 2-6 preanals. Snout-vent length 1020-1045 mm, tail 130-135 mm.

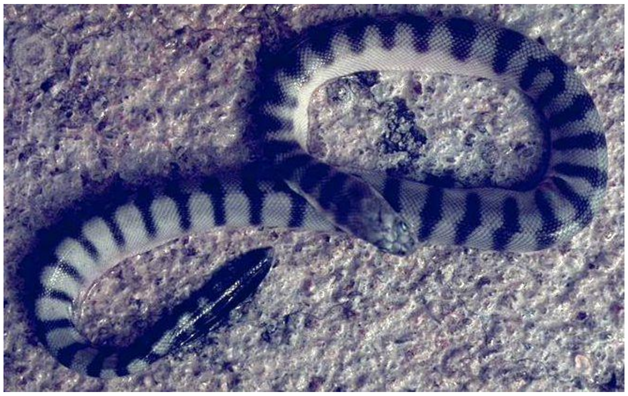


**Fig.11.15.** *Enhydrina schistosa* (Daudin).

*Colour*:
Dirty white to pale greenish gray, with olive to black crossbars, distinct on posterior half of body. Ventrum white to light yellow, throat white. Sides of tail with few dark scales. Large adults often uniformly olive above. Newborn white with vivid black bands.

*Habitat*:
Causing most of the fatalities among fishermen. It frequents estuarine waters with muddy bottoms and does not go into deeper waters,

frequents deep into creeks well away from the open sea.

*Range*:
From Gulf of Oman eastward to the coast of southern Viet Nam, along Australia to Rockhampton. It is a most common sea snake along the coastal waters of Pakistan.

### 3. *Hydrophis caerulescens* (Shaw)
(**Fig.11.16**)

1. Head small, not distinct from neck which is not markedly elongated.
2. Body strongly compressed laterally, about 2-3 times the diameter of neck.
3. Scales feebly imbricate or juxtaposed, distinctly keeled, 38-54 rows at midbody.
4. Supralabials 7, second in contact with the prefrontal, third and fourth are in eye, 9 infralabials.
5. Ventrals 301-310.
   Snout-vent length 770-785 mm, tail 97-104 mm.

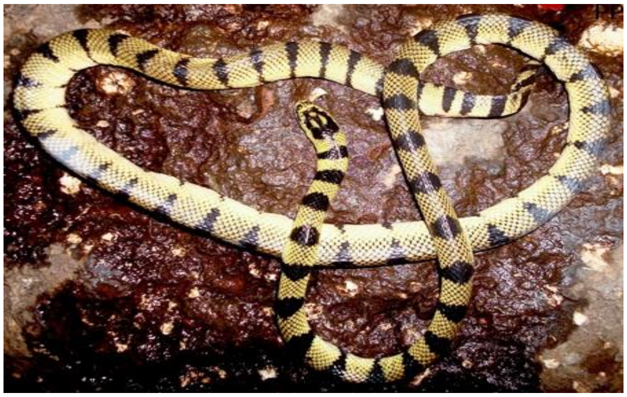


**Fig.11.16.** *Hydrophis caerulescens* (Shaw).

*Colour*:
Dorsum bluish gray, ventrum yellowish, with 39-62 broad dark bands, about twice as broad as interspaces, becoming indistinct with age. Head dark in young, becoming dark gray in adult, usually with a light streak through eye.

*Habitat*:
The blue-green sea snake has been recorded from mangrove swamps near Karachi, Sindh, Pakistan.

*Range*:
Wide ranging in Southeast Asia, from the northern coast of Australia, to Queensland, Borneo, Java, Malaya, Myanmar, and along the coasts of China, Siam, India. In Pakistan it has been reported from the Karachi coast.

### 4. *Hydrophis cyanocinctus* Daudin
(**Fig.11.17**)

1. Head moderately small, slightly distinct from neck, rostral prolonged ventrally.
2. Body cylindrical anteriorly, laterally compressed posteriorly.

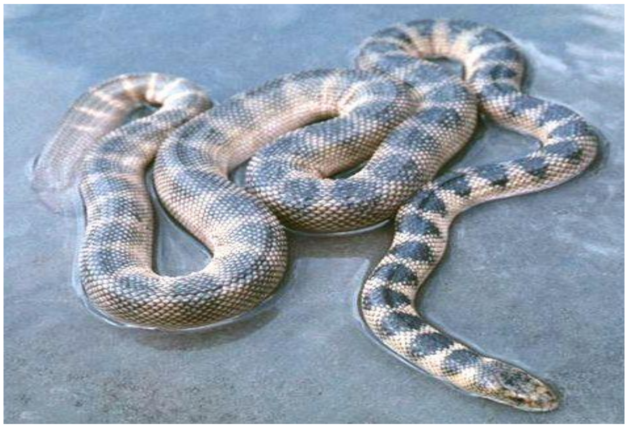


**Fig.11.17.** *Hydrophis cyanocinctus* Daudin.

3. Scales imbricate with 2-3 keels, or row of tubercles, 38-48 at midbody.
4. Supralabials 7-8, second in contact with prefrontal, 2-3 touching eye, 9-10 infralabials.
5. Ventrals distinct 314-384, anteriorly about twice the size of adjacent scales, a little smaller posteriorly.
   Snout-vent length 1500-1650 mm, tail 130-140 mm.

*Colour*:
Dorsum dirty white, pale green or yellow, with 47-70 black cross bands, those at midbody widest, central part of the bands often include light scales. Markings on body usually disappear with age.

*Habitat*:
It has been netted from shallow muddy mangrove swamps during monsoons, after which it migrates to the open sea.

*Range*:
Wide ranging species from the Persian Gulf along the coastal waters of Pakistan, the Indian coast, Sri Lanka, Bangladesh, Siam (Thailand), Islands of Indonesia to the Sea of Japan.

### 5. *Hydrophis fasciatus* (Schneider)
(**Fig.11.18**)

1. Head very small, body very slender anteriorly, deep, and greatly compressed posteriorly.
2. A series of 2-4 small scales behind parietals and between posterior temporals.
3. Supralabials 6-7 (rarely 5), third and fourth touching eye, last 1 or 2 very small.
4. A small "cuneate" scale between third and fourth infralabials.
5. Posterior body scales imbricate, slightly hexagonal, 49-53 at midbody, with a central tubercle or keel.

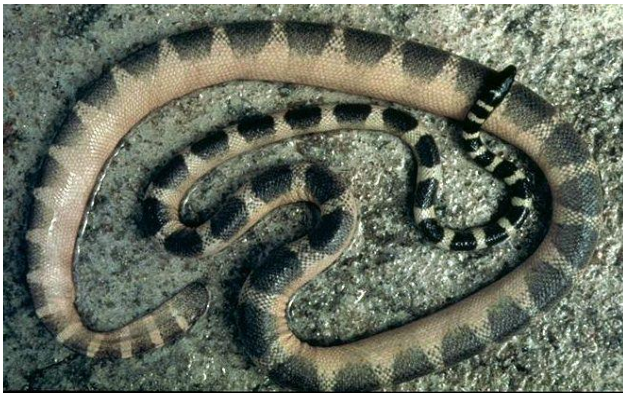


**Fig.11.18.** *Hydrophis fasciatus* (Schneider).

6. Ventrals with double keel, 323-514 at midbody.
   Snout-vent length 1080-1106 mm, tail 100-110 mm.

*Colour*:
Dorsum black to olive, with pale or yellowish oval spots on sides. Ventrum whitish. In young 50-70 black crossbars which may or may not form complete rings.

*Range*:
From coastal Pakistan it extends along the Indian coast, Sri Lanka, Myanmar to the Strait of Malacca.

### 6. *Hydrophis lapemoides* (Gray)
(**Fig.11.19**)

1. Temporals small, 2 + 3 or 3 + 3.
2. Supralabials 8, second in contact with prefrontal, third and fourth or third to fifth touching eye.
3. Scales at midbody 39-45, a feeble tubercle or keel on scales of posterior half of the body.
4. Ventrals 324-346, bicarinate.
   Snout-vent length 930-950 mm, tail 94-100 mm.

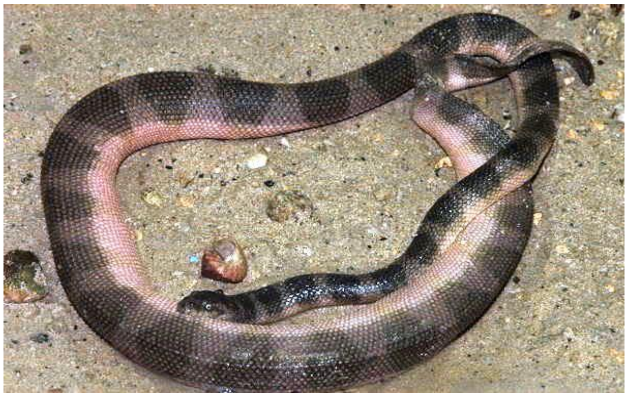


**Fig.11.19.** *Hydrophis lapemoides* (Gray).

*Colour*:
Young snakes with yellowish or whitish

dorsum, with 32-43 dark crossbars. Head dark with a yellow curved mark. In older specimens markings on body become less pronounced.

*Habitat*:
Invades estuarine waters, and is often thrown on shore.

*Range*:
From the Persian Gulf, along coasts of Pakistan, India, and Sri Lanka.

### ***7. Hydrophis mamillaris*** (Daudin)
(**Fig.11.20**)

1. Temporals variable, usually 2-3 imbricate scales.
2. Supralabials 7, second in contact with prefrontal, third and fourth touching eye; usually a small "cuneate" scale between third and fourth infralabial.

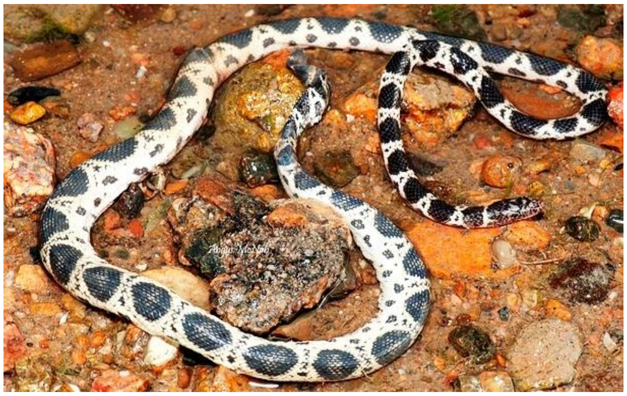


**Fig.11.20.** *Hydrophis mamillaris* (Daudin).

3. Scales at midbody 39-43, those of posterior part of body, hexagonal, with a central tubercle or short keel, juxtaposed, or feebly imbricate.
4. Ventral 305-384, bicarinate.
   Snout-vent length 743-750 mm, tail 63-70 mm.

*Colour*:
Dorsum yellowish or grayish, with 43-57 broad crossbars, about twice as broad as their interspaces, usually connected along ventrals. Head entirely black with a yellow streak on temporal region.

*Range*:
From Karachi coast, along peninsular India.

### ***8. Hydrophis ornatus*** (Gray)
(**Fig.11.21**)

1. Head large, its breadth between eyes half or more than half its length; robust body, not markedly elongated, diameter of its posterior half about twice that of neck.
2. Supralabials 7-8, second in contact with prefrontal, third and fourth in eye.
3 A pair of overlapping anterior temporals.
4. Anterior genials well developed, in contact with each other, while posterior pair not well defined, separated from each other by small scales.

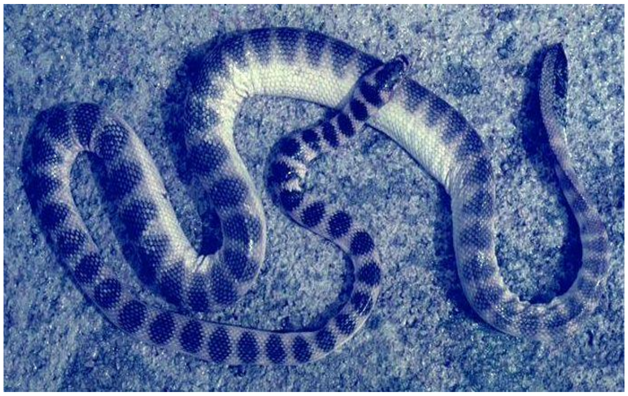


**Fig.11.21.** *Hydrophis ornatus* (Gray).

5. Body scales slightly imbricate or juxtaposed, with a central tubercle or short keel.
6. Rows at midbody 33-55.
7. Ventrals 209-312, distinct.
   Snout-vent length 850-855 mm, tail 107-115 mm.

*Colour*:
Dorsum grayish, olivaceus, or white, with dark

bars or rhomboidal spots. Ventrum yellowish or whitish. Head olivaceus.

*Range*:
From Persian Gulf, along coastal Karachi, peninsular India, Bangladesh, Sri Lanka, Siam, and New Guinea.

### *9. Hydrophis spiralis* (Shaw)
(**Fig.11.22**)

1. Head slightly distinct from neck, body slender and moderately compressed.
2. Supralabials 6-8, third and fourth or third to fifth in eye.

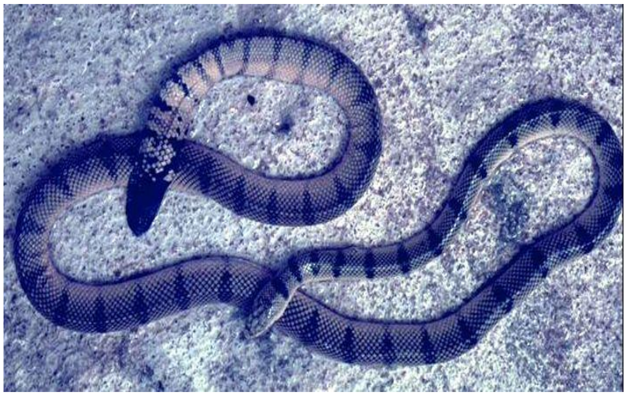


**Fig.11.22.** *Hydrophis spiralis* (Shaw).

3. Anterior and posterior genials well developed and in contact with each other.
4. Scales feebly imbricate, smooth or with a small tubercle or short keel.
5. Ventrals 340-350, distinct, twice as broad as adjacent scales.
6. Considerably enlarged preanals 2-5.
   Longest sea snake, snout-vent length 1896-1920 mm, tail 135-145 mm.

*Colour*:
Dorsum golden yellow to yellowish green, scales with dark borders, with 35-54 dark stripes which are narrower than interspaces, and are dark spotted. Flanks and ventrum of body pinkish white. Head in adult entirely yellow, in young blackish, with a yellow horseshoe-shaped mark.

*Habitat*:
It is a deep-sea snake, not venturing into estuarine waters. A gravid female contained 7 embryos in uteri.

*Range*:
From Persian Gulf along coastal Pakistan and India, Sri Lanka, Bangladesh, Myanmar to Celebes and the Philippines.

### *10. Lapemis curtus* (Shaw)
(**Fig.11.23**)

1. Body short, laterally strongly compressed, head short, slightly distinct from neck.
2. Rostral wider than high, trifid.
3. Single pre- and postocular, parietals broken into 5-6 small scales.
4. Nasal suture touching second supralabial. 6-7 supralabials, fourth touching eye; 9 infralabials.
5. Anterior genials small, not in contact with each other, posterior not differentiated.
6. Body scales smooth or with a central tubercle, male with short spine on lowest row, 35-39 at midbody.
7. Ventrals 165-180, anterior distinct, wider, posterior narrower, a pair of enlarged preanals.
   Snout-vent length 625-630 mm, tail 50-55 mm.

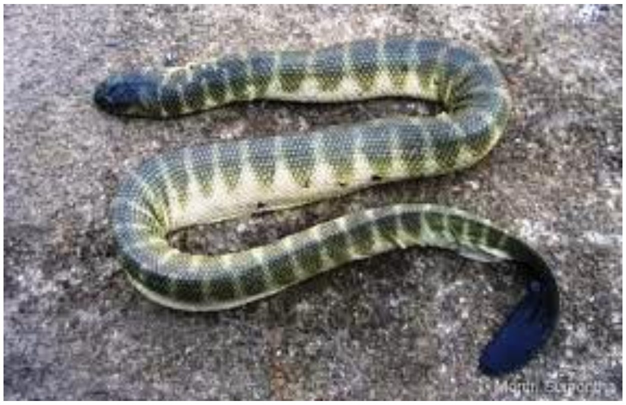


**Fig.11.23.** *Lapemis curtus* (Shaw).

*Colour*:
Dorsum pale olive, becoming white or pale yellow on sides. Black or dark olive crossbars 44-55 forming a median zigzag pattern, fading on sides. Head dark gray or olive; distal half of the ail black.

*Range*:
From Persian Gulf, along Makran and Karachi coasts, peninsular India, Sri Lanka to Madras.

### *11. Microcephalophis cantoris* (Günther)
(**Fig.11.24**)

1. Head very small, narrow, not distinct from long cylindrical neck.
2. Body stout, laterally compressed.
3. Single preocular, postocular, and temporals.
4. Supralabials 5-6, second and third or only the third in contact with the prefrontal, 7-8 infralabials.
5. Genials distinct, subequal
6. Ventrals 404-468.
   Total length 1450-1800 mm, tail 83-90 mm.

*Colour*:
Anterior half of the body light olive to yellow above, pale below, with gray to dark dorsal bars, and a black midventral stripe. While posterior half dark olive above, laterally yellowish, with faint lateral bars.

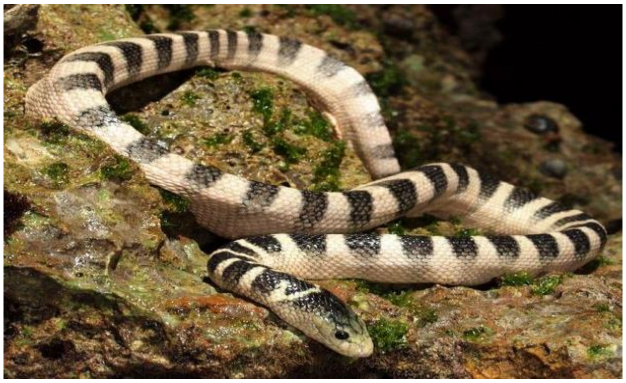


**Fig.11.24.** *Microcephalophis cantoris* (Günther).

*Range*:
From Karachi to Cannore, and on the east from Orissa to Chittagong.

### *12. Microcephalophis gracilis* (Shaw)
(**Fig.11.25**)

1. Second supralabial in contact with prefrontal.
2. Third supralabial not in contact with the prefrontal.
3. Ventrals 220-350.
   Total length 950-1020 mm, tail 80-96 mm.

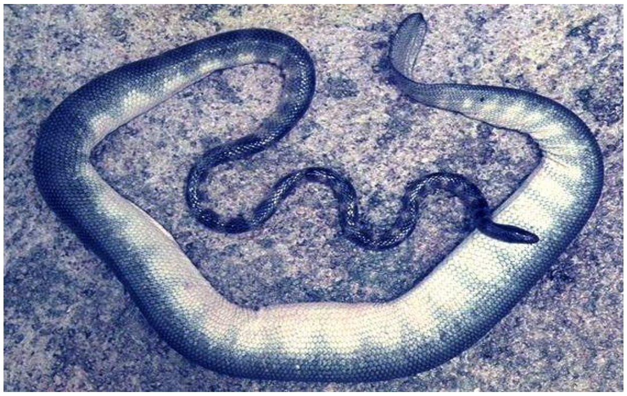


**Fig.11.25.** *Microcephalophis cantoris* (Günther).

*Colour*:
Head, chin, and throat region black to dark olive, with white to pale yellow spots or crossbars. Posteriorly pale yellow to greenish white with gray crossbars, or more or less uniformly gray above and light laterally and ventrally. Ventrum pale. Juveniles dark, with 40-60 light bars or paired spots.

*Range*:
From Persian Gulf, around the coast of Pakistan, India to China, Hong Kong, Borneo, and northern Australia.

### *13. Pelamis platurus* (Linnaeus)
(**Fig.11.26**)

1. Head long, narrow, distinct from neck

which is not slender, body markedly compressed laterally.

2. One pre and 2-3 postoculars; anterior temporals 2-4.
3. Supralabials 6-8, with 1-3 small intercalated scales, fourth in contact with eye or separated from it by a subocular; 9-13 infralabials.

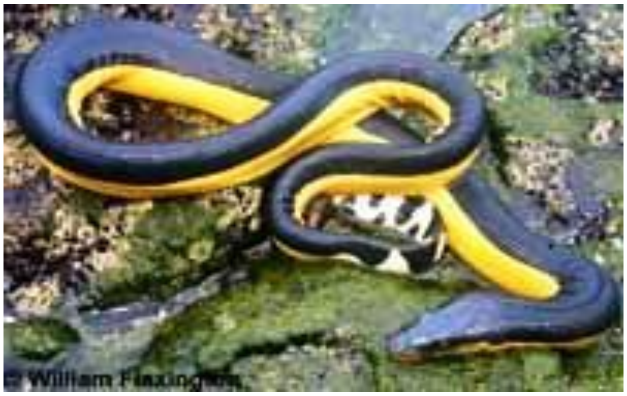


**Fig.11.26.** *Pelamis platurus* (Linnaeus).

4. Three subequal pairs of genials widely separated from each other.
5. Midbody scales 45-55, juxtaposed, quadrangular, smooth, in male lowest row with minute tubercles, anals 3-5, moderately enlarged.
6. Ventrals 47-63, indistinguishable from adjacent scales.

   Snout-vent length 880-900 mm, tail 83-100 mm.

*Colour*:

Dorsum light yellow to cream, ventrum pale, dorsum with 10-19-scale thick brown stripes. Head brownish. Tail with black and white bars or network.

*Habitat*:

It is a very pelagic snake, rapid, graceful and an agile swimmer. It is often cast onto sandy beaches, where it dies helplessly.

*Range*:

Persian Gulf westward to the Cape of Good Hope; eastward from coastal Pakistan to New Zealand, then northward to Possiet Bay, Kamchatka. In American waters it has been recorded from the Gulf of California to Ecuador.

### ***14. Praescutata viperina*** (Ph. Schmidt) (**Fig.11.27**)

1. Head short, wide, distinct from neck, body moderately thick, posteriorly laterally compressed, rostral with three short rojections fitting into chin grooves.
2. One, rarely 2 preoculars, 2, occasionally 1, postocular.
3. Two anterior, 3-4 posterior temporals.
4. Supralabials 6-7, third or fourth, or both touching eye.
5. Infralabials 7-8.
6. Genials distinct, subequal, not touching each other.
7. Midbody scales 36-50, smooth, or with short keel, juxtaposed.
8. Ventrals 233-280, anterior-most about half the width of neck, decreasing in size, until at vent about the size of adjacent scales, 4-5 enlarged preanals.

   Snout-vent length 642-650 mm, tail 74-80 mm.

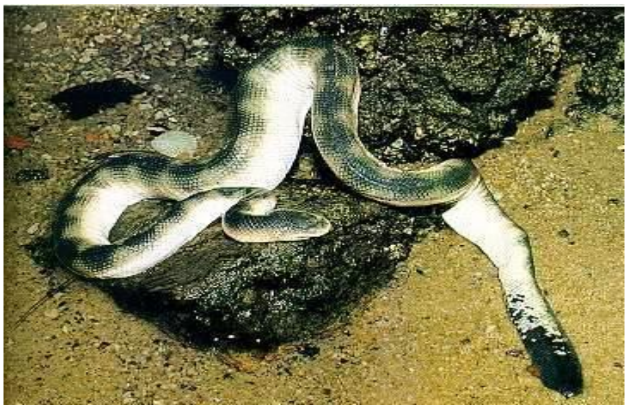


**Fig.11.27.** *Praescutata viperina* (Ph. Schmidt).

*Colour*:

Dorsum greenish white, with a median series of

24-34 rhomboidal blotches, fused at midline. Head dark, labials and neck whitish, tail black.

*Habitat*:
This species has been recorded from tidal creeks, several miles from the open sea.

*Range*:
From Persian Gulf along Makran coast, around coastal India to southern China, thence to Borneo and Java.

# APPENDIX

## Scientific, common English and Urdu names

| Scientific names | Common English | Roman Urdu | Urdu |
|---|---|---|---|
| *Bungarus caeruleus caeruleus* (Schneider, 1801) | Krait | *Sangchoor* | سنگچور سانپ |
| *Bungarus sindanus razai* M.S. Khan, 1985 | South Punjab Krait | *janubi Punjab Sangchoor* | جنوبی پنجاب سنگچور سانپ |
| *Bungarus sindanus sindanus* Boulenger, 1847 | Sindh Krait | *Sindh Sangchoor* | سندھی سنگچور سانپ |
| *Naja naja* (Linnaeus, 1758) | Black Cobra | *Sheesh nag* | شیش ناگ سانپ |
| *Naja oxiana* (Eichwald, 1831) | Brown Cobra | *Bhoora nag* | بھورا ناگ سانپ |
| **Family Viperidae** | Viper Snakes | *Afi* | افعی |
| *Daboia russelii russelii (Shaw & Nodder, 1797)* | Russell's Chain Viper | *Koriala saamp* | کرڑیالا سانپ |
| *Echis carinatus astolae Mertens, 1969* | Astola Viper | *Astola khappra* | اسٹولا کھپرا |
| *Echis carinatus multisquamatus Cherlin, 1981* | Waziristan Viper | *Waziristan khappra* | وزیرستانی کھپرا |
| *Echis carinatus sochureki Stemmler, 1964* | Sindh Valley Viper | *Sindh khappra* | سندھ وادی کھپرا |
| *Eristicophis macmahonii Alcock & Finn, 1897* | Leaf-nose Viper | *Titli-naak Afi* | تتلی ناک افعی |
| *Macrovipera lebetina obtusa (Dwigubsky, 1832)* | Levantine Viper: | *Romn Afi* | بجیرہ روم کا افعی |
| *Pseudocerastes bicornis Wall, 1913* | Two-horned Viper | *Du-singha Afi* | دوسنگہ افعی |
| *Pseudocerastes persicus (Duméril, Bibron, & Duméril,* | Iran Viper | *Irani Afi* | ایرانی افعی |
| **Family Crotalidae** | Pit Viper | *Hafrai Afi* | ہفرعی سانپ |
| *Gloydius himalayanus (Günther, 1864)* | Himalayan Pit Viper | *Himalayai Hafrai Afi* | ہمالیائی ہفرہ افئی |

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